

POPULAR Computing WEEKLY

35p

9 December 1982 Vol 1 No 34

This Week

Atari software

Tony Bridge looks at some of the Christmas offerings for the Atari 400/800 micro. See page 12.

Vic20 tape index

John Ingham's index routine enables you to sort through a number of programs on one tape. See page 23.

Dragon art

Four random art generation programs from Dave Windle take you into the realms of Dali and Picasso on page 25.

Ivan Berg

David Kelly profiles Ivan Berg, the software mastermind who is bringing programs from the stars. See page 11.

Lunar Lander

Have you ever wondered what it would be like to be an astronaut? Find out in Gordon Cooper's new game for the 16K Spectrum and 1K ZX81 on page 8.

News Desk



Torch 280 disc pack.

Torch prices drop in line with costs

TORCH Computers has slashed the prices of its product range by up to 30 per cent.

The price of the Torch computer system drops from £4019 to £2795 and the price of the Torch 280 disc pack falls from £1144 to £895.

Director Martin Vlieland-Boddy explained "I'm just getting more competitive!" Part of the reason for the price drops is reduced manufactur-

ing costs. Torch recently took over the factory and some staff of the now defunct Arfon Computers in Caernarfon. This has meant that Torch can now itself undertake some of the manufacture, rather than subcontracting the work out.

At £895, the Torch twin-disc 800K drives, operating system and 280 card is the cheapest way of running CP/M software on the BBC micro, with which it is compatible.

Northern fair

OVER 5000 people turned up to the first day of the Northern Computer Fair in Manchester on November 25-27. Little new hardware or software of any note was launched and the established names in the market such as Atari, Sinclair and Commodore stayed away from the exhibition, sceptical of promised crowds of up to 20,000.

The new companies such as Dragon Data and Lynx built impressive displays and reaped the rewards of attending the first major computer exhibition outside London. Quicksilver's spectacular new 4D Timegate program was undoubtedly the star attraction.

Picturesque, Bug-Byte, A&F Software, Artic and Macronics displayed their existing range of products, with special Christmas discounts for customers at the fair.

The Northern Computer Fair is part of an attempt by IPC, the international publishing conglomerate, to shake the Personal Computer World Show's dominance of the exhibition market.

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer.
Ring 01-930 3266 and give us the details.

PHILIPS 354 including keyboard, printer card reader, manuals and stationery, for use or as parts, £125. Tel: Mr Parker 01-586 1059 weekday evenings; Locks Heath 04895 3818 weekends.

ZX SPECTRUM, 16K, one book, £100. B. Burbage. 01-575 1676 (anytime).

SPECTRUM 48K + tape recorder, £195. Tel: 0532 524544 after 6 pm.

PET DISC OFFER. One only, more than £100 of software, including Invaders, Assembler, Jail Break, Word Processor. Will accept £30 one. Tel: 0458 251882.

SPECTRUM 16K, with software, £115 one. Tel: 0705 373357 (after 4 pm) Mon-Fri.

SHARP M280K 48K, 18 months old, mint condition, extended Basic plus Forth interpreter, editor, documentation, Sharp newsletter, £350 one. Tel: Tim on 01-908 3986 after 6 pm.

ZX SPECTRUM 48K. Tel: Hornchurch (49) 53420, Mr Brock.

COMMODORE 4022 PRINTER — excellent condition, £250 inc. cables. Tel: Cosham 321212 ext 5233, Mr Mike Ball (days).

48K SPECTRUM. Untouched, brand new, with horizon tape plus Spectral Invaders and Cambridge colour collection, 2 x 5 pack of printer paper, £195.00 one. Tel: 021-451 2328.

ACETRONIC MPU 2000 TV game, 26 cartridges including Hobby Module, £100. Tel: 01-878 6448, Mr A. Campbell, 85 Arabella Drive, Roehampton, SW15 5LL.

ZX SPECTRUM, 48K, OK-Tronics keyboard, Telesound 82 unit, software worth £260, yours for £200, also ZX printer + 9 rolls paper, £45. A. Weed, Hinkley (0455) 30559 (after 4 pm).

16K VIC20, with ARFON expansion, 4 cartridges, many books, many tapes, cassette player, £250. Tel: 0342-713643 (evenings).

ZX SPECTRUM 48K, plus software, etc., £170 one. Tel: Abingdon 31218.

SWAP. Brand new Jupiter Ace, 111 leads and manual for 16K ZX81 + printer. Tel: Halifax 249181, Mr M. Wells.

SPECTRUM 16K, 1 week old, £125. Tel: (weekdays after 7 pm) 01-843 7777.

DRAGON 32, £270.00 including cassette recorder, joystick, two cartridges, cassette games. Tel: 01-402 0953, Mr A. K. Sullivan.

16K ZX81, in good condition, with manual and magazines, £45. Tel: 0702 (Southend) 588013.

MATELS INTELLIVISION, five cassettes including Star Track, good condition, £90.00 one. Tel: Watford 29952.

BATTLESTAR IS COMING

ROMIK SOFTWARE

24 Church Street, Slough SL1 1PT. Telephone: Slough (STD 0753) 71835



**ROMIK PROMISE
A MINIMUM OF
ONE NEW GAME
EVERY MONTH**

Britain's leading games software house are proud to announce our new range of exciting games and other software for Vic20 and ZX81 (see panel). (Games for BBC, Dragon, Spectrum and Atari available soon.)

**ALL ACTION GAMES CARRY A FREE ENTRY TO NATIONWIDE COMPETITIONS WITH FANTASTIC PRIZES
ALL PROGRAMS ARE £9.99**

MARTIAN RAIDER

For unexpanded Vic20

Skim as close as you dare to the surface of the planet, devastating the Martian cities, destroying ammunition dumps (gaining more time), shooting down the ground-to-air missiles

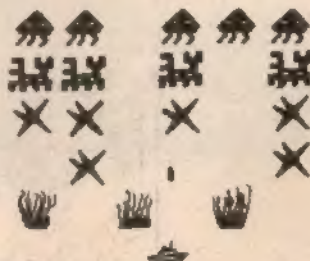


"A real action shot of the game"

SEA INVASION

Unexpanded Vic20

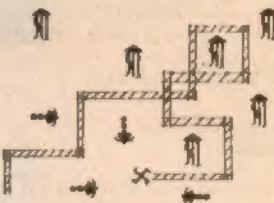
Fight off the attacking sea creatures for as long as you can. Shoot the whale for a surprise score, watch out for the crabs, starfish and octopuses.



SHARK ATTACK

For unexpanded Vic20

You are in shark-infested waters after being thrown overboard from a pirate ship. Your only protection being an atomic net which you trail behind you, trying to cover all the visible ocean and ensnare the sharks at the same time. Beware of stopping or covering your tracks for too long, if you do, then the sharks will escape and come after you. Watch out for the ever increasing deadly octopi (sometimes the sharks will eat part or all of one!)



"A real action shot of the game"

MOONS OF JUPITER

For expanded Vic20, 3K, 8K or 16K

You are the Commander of a fleet of destroyers looking on from the safety of a mother ship, you send in one destroyer at a time to blast a passage through the MOONS OF JUPITER. Your destroyers have to dodge, and blast the UFOs... Watch out for the Golegs they can smash your destroyers, but you cannot harm them.

A MACHINE CODE ARCADE QUALITY GAME

MIND TWISTERS

For unexpanded Vic20

Four games to stretch your brain

Blackjack, Decoder, Four Thought and Teaser are our computerised versions of very popular home games and will test your mental agility and skill for many a long hour.

MULTISOUND SYNTHESIZER

For the unexpanded Vic20

The Vic Multisound Synthesizer is very flexible and can be played in more ways than can ever be explained here, to create music and special effects. For example, create "any tune, up to 255 notes (after following appropriate instructions), then press "F1" or "F3", then key "B" and enjoy the added effect. Now hit "+", listen to the difference. For a surprise — hit "—", Now add a melody over the top — hit key "B" then "T" — now play a melody, or experiment. Have fun!

ROBOT PANIC

A fantastic high-speed game on cartridge. The price is yet to be announced, but around £16...

NEW NEW NEW SPACE ATTACK

For the unexpanded Vic20

SPACE ATTACK is a game of skill. You as the pilot of an intergalactic battleship have to fight your way through wave after wave of various alien spacecrafts.

**MACHINE CODE
ARCADE QUALITY GAME**

SPECIAL OFFER... C4 COMPUTER CASSETTES

£2.50 for 10; £20 for 100

Available post free from the above address only

SUPER NINE ZX81

NINE 1K GAMES

1. CANYON
2. ASTEROIDS
3. ASTROBLASTER
4. DEFENDER
5. SQUASH
6. SCRAMBLE
7. SKETCH
8. COSMIC RAIDER
9. FOUR THOUGHT...

OUR GAMES ARE AVAILABLE FROM ALL GOOD HOME COMPUTER SHOPS, INCLUDING:

Micro C inside Currys at: Birmingham (233 1105), Leeds (45801), Luton (425879), Nottingham (412455), Southampton (29676), inside Bridgers at: Bristol (650501), New Malden (01-949 2091), and at: Leicester (546224), London (01-387 9275), Manchester (834 0144) ... Chromasonic Electronics, 48 Junction Road, Archway, London N19 (01-263 9493/9495), Maplin Electronic Supplies Ltd., P.O. Box 3, Raleigh, Essex (0702 552911/554155), Gemini Electronics, 50 Newton Street, off Piccadilly, Manchester (236 3083), Gomer, 24 Gloucester Road, Brighton ... Dixons, Queensmere, Slough (23211) ... Channel One, 174 High Street, Hornchurch, Essex (75613) and Golden Cross Parade, Rochford, Essex (540455), Twill Star Computer, 17 Regina Road, Southall ... Data Assets, 44 Stratton Street, London NW1 ... Graham & Son, 51 Gorlin Road, Omagh, N. Ireland ... Ram Electronics, 88 Fleet Road, Fleet, Hants. (5858) ... Eccleston Electronics, Legge Lane, Birmingham ... The Computer Centre, 14 Hemmels, Laidon, Essex (0268 416155) ... Microspot, 15 Moorfields, Liverpool ... R. Seadie, 47 Woodlands Road, Ansdell, Lytham St. Annes ... Cambridge Computer Centre, 1 Emmanuel Street, Cambridge ... Karlinda & Co., Elliott Road, Selly Oak, Birmingham ... The Sharp Computer Shop, Melville Street, Lincoln ... Millaquip, 7A Hare Lane, Gloucester (411010) ... North West Business Machines, Curate Street, Great Harwood, Lancs. ... Instep Footwear, 23 King Street, Great Yarmouth ... J.A.D., 21 Market Avenue, Plymouth (669462).

The Team

Editor

Brendon Gore

News Editor

David Kelly [01-930 3271]

Sub-editor

Ninette Sharp

Editorial Secretary

Theresa Lacy

Advertisement Manager

David Lake [01-839 2846]

Advertisement Executive

Alastair Macintosh [01-930 3260]

Managing Editor

Duncan Scot

Publishing Director

Jenny Ireland

Popular Computing Weekly,
Hobhouse Court, 19 Whitcomb Street,
London WC2
Telephone: 01-839 6835

Published by Sunshine Publications Ltd.

Typesetting, origination and printing by
Chesham Press, Chesham, Bucks

Distributed by S M Distribution
London SW9. 01-274 8611. Telex: 261643

© Sunshine Publications Ltd 1982

Subscriptions

You can have *Popular Computing Weekly* sent
to your home:
UK Addresses

26 issues £9.95

52 issues £19.95

Overseas Addresses

26 issues £18.70

52 issues £37.40

How to submit articles

Articles which are submitted for publication
should not be more than 3,000 words long. The
articles, and any accompanying programs,
should be original. It is breaking the law of
copyright to copy programs out of other mag-
azines and submit them here — so please do not
be tempted.

All submissions should be typed and a double
space should be left between each line. Please
leave wide margins.

Programs should, whenever possible, be
computer printed.

We cannot guarantee to return every submit-
ted article or program, so please keep a copy. If
you want to have your program returned you
must include a stamped, addressed envelope.

Accuracy

Popular Computing Weekly cannot accept any
responsibility for any errors in programs we
publish, although we will always try our best to
make sure programs work.

This Week

News

5

Call for import controls.

Letters

6

Spectrum defended.

Lunar lander

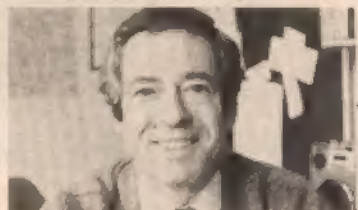
8

A new game for 16K Spectrum and 1K
ZX81.

Street Life

11

David Kelly talks to Ivan Berg.



Reviews

12

Tony Bridge looks at the latest software
for the Atari 400/800.

Open Forum

17

Five pages of your programs.

Programming

23

Tape Index for Vic20 by John Ingham.

Spectrum

24

Unifile — module 5.

Dragon

25

Random art generation.

Machine code

26

Executing instructions.

Peek & Poke

27

Your questions answered.

Competitions

31

Puzzle, Ziggurat, Top sellers, Losers

Editorial

There have been cries in certain quar-
ters to restrict the import of foreign
micros. Representations have already
been made to the government to this
effect.

Protectionism is an issue that has
implications spreading far beyond the
world of micros. Differing groups have
tried to ban the import of foreign cars,
steel and even football players.

The protectionist argument is that
we must preserve our domestic indus-
tries from unfair competition. Coun-
tries which dump their goods on Bri-
tain at ridiculously low prices must be
stopped. If France can force Japan to
sell its video recorders through one
tiny customs post, effectively reducing
the flow of imports to a trickle, so can
we.

But, the obverse of this coin is that if
we ban other people's goods they will
ban ours. Thus you may limit imports,
but you will also restrict exports.

Whatever the merits of the protec-
tionist argument, it is not one that
applies to the home micro industry.
This is one of the few fields where
Britain actually leads the rest of the
world. Far from worrying about im-
ports, we should be out selling our
micros to the Americans, the
Japanese and everyone else.

Next Thursday

In our special Christmas issue, Stephen
Adams looks at the pros and cons of
QSave — a combined hard and software
device which can dramatically speed
up loading and saving on the ZX81. He
also reviews the LMX Prom program-
mer for the ZX81.

Also next week, Asghar Ahmed tests
your knowledge of anatomy with a
skeleton program for the Vic20.

Subscribe to Popular Computing Weekly

I would like to subscribe to *Popular Computing Weekly*.

Please start my subscription from the issue.

UK Addresses: ☐ 26 issues at £9.95 ☐ 52 issues at £19.95

Overseas Addresses: ☐ 26 issues at £18.70 ☐ 52 issues at £37.40

Please tick relevant box

I enclose my cheque to *Popular Computing Weekly* for

Name

Address

Please send this form, and cheque, to *Popular Computing Weekly*, Subscription Dept., Hobhouse Court, 19
Whitcomb Street, London WC2 7HF.

THE SPECTRUM 'ADD-ON'

ONLY £19.50 + VAT

COMPLETE your SPECTRUM with our Multi-purpose Sound Generator and Joystick-port Board!! With one low-cost purchase you can obtain the following outstanding improvements to your ZX SPECTRUM:

- THREE CHANNEL sound effects. PROGRAM three independent sounds with music, gun shots, explosions etc.
- AMPLIFICATION of the standard sound output.
- PROVISION of JOYSTICK PORTS to allow simple connection of one or two suitable joysticks (see below).

The 'ADD-ON' uses the amazing AY-3-8910 SOUND Chip, which gives you an enormous range of sound effects. The output and volume of each channel can be separately controlled, with gun shots, explosions, drums etc., produced under the 'sound envelope'. MOST IMPORTANT TO NOTE—the CHIP is 'processor independent.' This means that sounds can continue to be produced without any noticeable effect on the speed of your program!!

The 'ADD-ON' contains its own speaker and amplifier chip and is supplied with a cassette containing sound demonstration routines and some sample sounds. The 'ADD-ON' simply plugs straight onto the back of your SPECTRUM. No soldering is required. The 'ADD-ON' is offered at the incredibly low price of £19.50 + VAT.

COMPLETE YOUR SPECTRUM NOW!!

JOYSTICK KITS £3.95 + VAT

To complement our exciting new 'ADD-ON' for the SPECTRUM we are offering low-cost Joystick Kits. Each one contains a potentiometer joystick, a fire-button and a suitable connector.

NEW ORIGINAL SPECTRUM SOFTWARE

— from PROGRAM POWER — using the 'ADD-ON' to great effect!!

CABMAN (Machine Code) £3.95 + VAT

You are the owner of a fleet of yellow taxis. A rival firm competes with you, trying to steal your fares and run you off the road, if they can. Ten skill levels determine the number of opposing taxis, the speed at which they drive and the amount you earn per completed journey. MAXIMISE your earnings before you lose your entire fleet. This program is FIRST CLASS.

ATTENTION MACHINE CODE PROGRAMMERS!

We can now offer SPECTRUM versions of the ASSEMBLER and DISASSEMBLER programs from ACS Software. The ZX81 versions have proved extremely popular.

ULTRAVIOLET (Assembler) £6.95 + VAT

INFRARED (Disassembler) £6.95 + VAT

BOOKS

SPECTRUM

Over the Spectrum £6.95

Cambridge Colour Collection £6.95

ZX81

Mastering Machine Code on your ZX81 £7.50

NOT ONLY 30 Programs £6.95

Getting Acquainted with your ZX81 £6.95

49 Explosive Games for the ZX81 £6.95

Making the most of your ZX81 £6.95

Byteing Deeper into your ZX81 £4.95

The Explorer's Guide to the ZX81 £4.95



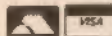
NOTE: We stock (and market) PROGRAM POWER SOFTWARE for the BBC, ACORN, SPECTRUM and DRAGON 32. Send S.A.E. for appropriate catalogue.

All programs are now available at all good dealers or direct from MICRO POWER LTD.

88a REGENT STREET, CHAPEL ALLERTON, LEEDS LS7 4PE. Tel: (0532) 683196

Please add 50p order P & P + VAT at 10%.

BBC, DRAGON & ACORN DEALERS



WRITTEN ANY PROGRAMS? WE PAY 20% ROYALTIES FOR DRAGON, SPECTRUM BBC, ACORN PROGRAMS

HILDERBAY Ltd
Professional Software, 8/10 Parkway, London NW1
Tel 01-485 1059 Tlx 22876

Our first software was produced on a valve computer (about as powerful as modern pocket computers, but occupying an enormous room). We established Hilderbay Ltd in 1979 and have since produced software for machines ranging from the Casio FX502P programmable calculator to the IBM 3033M mainframe. We have written software to calculate atomic absorption coefficients, mortgage payments, amplifier distortion coefficients, payroll data... At present, we are offering the following software: PAYROLL (£6.95) and BOOKKEEPER (£15) on APPLE II; PAYROLL (£25), STOCK CONTROL (£25), CRITICAL PATH ANALYSIS (£15), MORTGAGE & LOAN (£8.2) programs on one tape, and our fiendish text adventure game GOLD (£8) on the 48K SPECTRUM OPTIMAI (linear optimisation, 75 variables, 75 constraints, £40), BENCHMARK beam analysis for architects, £25, BUGBET (£15), TIME LEDGER (£15), and all the 48K Spectrum programs on the ZX81 with 16-48K (ZX81 ROM) is £4). TAPE saving and loading can be a problem. We have all the answers: (1) a tape recorder, aligned, tested and guaranteed by us which is OK for most computers (including Spectrum & Z80) (£24); (2) our Microcomputer User's Book of Tape Recorders (mainly for the typical computer user with a few notes for the electronics buff at the end, £3.10); (3) our Loading Aid (you get the volume right first time with no messing around, £3.95 for standard model, £7.95 for Deluxe model with large meter); (4) our Alignment Tape which enables you to set up your tape recorder correctly (no instruments to announce then. We have some VERY interesting items under wraps, but we don't want to announce them until they're ready. Come and see us at the Microfair on 18 December! (All prices include VAT & postage where applicable).

Linsac's ZX Companion series has received excellent press reviews:
"Far and away the best" — *Your Computer*
Thoughtfully written, detailed and illustrated with meaningful programs ... outstandingly useful" — *EZUG*

'The Spectrum Games Companion' is the latest addition to the series and is aimed at the games player and programmer alike. Twenty-one games designed specifically for the ZX Spectrum are included, with clear instructions on entry and play. Each program is explained fully with complete details on how it is designed and written. Introductory chapters show how to set up and use the Spectrum and how to create your own games. Later sections cover number games, word games, board games, simulation



games, dice games, card games and grid games. If you want to enjoy your ZX Spectrum and learn its secrets at the same time then this is the book for you!

Bob Maunder is co-author of 'The ZX80 Companion' and author of 'The ZX81 Companion'. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science, and is a Member of the British Computer Society.

The Spectrum Games Companion is available from good book shops, or send £5.95 to:

LINSAC, (PC) 68 Barker Road, Middlesbrough, Cleveland TS5 5ES

ONLY £5.95 Postage is free within the U.K. — add £1 for Europe or £2.50 outside Europe.

ISBN 0 907211 02 X

Curb on foreign micro imports

MICROCOMPUTER manufacturers plan to lobby Prime Minister Margaret Thatcher for more support for their industry.

The recently formed British Microcomputer Manufacturers Group (BMMG) has written to the Prime Minister indicating that help is urgently needed to ensure a future for micro manufacture in the UK. The BMMG is asking for legislation to control the flood of imported Japanese and American microcomputers and a firm buy-British commitment in Government purchases.

The increasing number of foreign imported micros is seen by the BMMG as a major threat. Commodore's Vic20 machine is now the world's top-selling micro and Hitachi, Casio, Sanyo, Sharp and Sord all have new products planned for launch.

The decision to seek Government support for their cause comes after the disclosure that, of the 25 approved suppliers for public contracts, only five are British. The Central Computer and Telecommunications Agency, the body responsible for choosing the approved companies, is at the moment drawing up a revised list. The BMMG's action is

intended to influence this selection.

The group has 20 members — but neither Acorn Computers, Computers, Dragon Data, Grundy nor Jupiter Cantab are included.

Ironically, the only major home computer manufacturer among the BMMG's membership — Sinclair Research — is openly critical of its action.

"We are selling well in the UK despite overseas competition and since well over half of our manufacture is for export it would certainly not be in our interests to see the introduction of import quotas on micros," said a Sinclair spokesman.

"In essence, the Government has a buy-British commitment already — just look at the machines included in the Government's Micros in Schools Schemes," he added.

Reaction from some non-member manufacturers has also not been favourable. Martin Vlieland-Boddy of Torch Computers, commenting on the proposal for import restrictions, said: "It is disgusting. If you cannot compete in an open market then it is a reflection on your company — and not on the government."



ZX Speech Synthesizer.

Speaking of Sinclair...

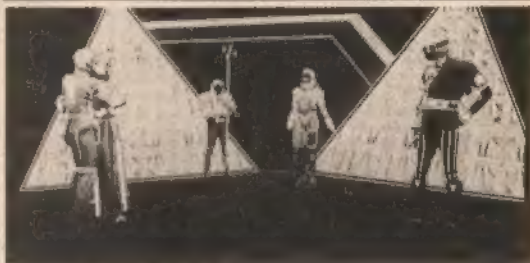
THE Chatterbox is a new speech synthesizer compatible with the ZX81 and ZX Spectrum microcomputers.

Built by William Stuart Systems, the unit has a virtually

unlimited vocabulary. It uses the technique of phoneme synthesis where each word is broken down into a comparatively small number of sounds — vowels, diphthongs and consonants.

Any word can then be formed from these components. The module can hold a word typically in about six bytes — in 10K about 1,600 words can be stored.

The Chatterbox costs £49 plus VAT and is available from William Stuart Systems, Dower House, Herongate, Brentwood, Essex.



Trapped inside a video game.

Disney competition for schools

OVER £15,000 in prizes is being offered to schools in a competition organised jointly by Disney and Acorn Computers.

The competition involves writing an idea for an adventure game, based on the new video-game movie from Disney — *Tron*.

The competition is open to both primary and secondary schools. Primary school entries must describe a plot of a game in 100 sentences of 10 words or less.

There is no limit on the length of secondary school submissions, but both written and visual representation should be included. No knowledge of programming is required — all that is wanted is a good idea and a vivid imagination.

The winner will receive as a first prize an Acorn BBC model B microcomputer with discs and teletext adapter.

Details of the competition can be obtained from Acorn Computers.

Dragon move attacked by MP

A LABOUR MP has hit out against Dragon Data's intention to move away from unemployment-torn Swansea.

Alan Williams, Labour MP for Swansea West, has criticised the decision in a letter to Welsh Secretary Nicholas Edwards. "It is no good Thatcher and Tebbit telling the unem-

ployed to get on their bikes if you are putting our jobs on the backs of lorries," he said.

Dragon Data plans to move to premises provided by the Welsh Development Agency at Kenfig Industrial Estate in South Glamorgan. The company hopes to switch locations in mid-December.

Dragon to get disc drive

LONDON-based Compusense has developed a 5¼" disc drive for the Dragon 32 microcomputer.

Single or twin double density drives should be available from mid-January. Complete with serial port (RS232C) and Flex operating system, the disc

drives start at £450, excluding VAT.

Compusense has also developed a machine code monitor for the Dragon which allows you to write assembly language programs. It costs £18.40 including VAT and postage.



IT Andromeda Zita-P.

IT launch new portable micro

IT COMPUTER Services Ltd of Staines has launched a series of portable micros to rival the Osborne 1.

The Andromeda Zita-P, bottom of the range at £995, includes a 10 inch display, full Qwerty keyboard and 125K disc drive. The package comes in an aluminium carrying case, which is hinged to provide

access to cables and interfaces.

This compares with the Osborne 1 which costs £1,250 and includes two 5¼ inch floppy disc drives and an RS232C interface.

At the other end of the scale, the Andromeda Zita-P 4.3 costs £2,095 but includes three integral drives, each with 1Mbyte capacity.

Straight from the shoulder

As a first time reader of your weekly and a member of the Spectrum waiting list, I was alarmed by the anti-Sinclair tone of your November 4 issue. In your columns I read that the Spectrum was rejected by educationalists, spurned by readers and damned in your editorial.

Surely the Spectrum cannot be all that bad? Is there anyone who can convince me that I am not wasting time and money in the Spectrum queue, and that I should spend more for the same now, or spend less for less now? Or have I been hoodwinked by the Sinclair publicity machine? Or am I being misled by the anti-Sinclair band wagon? The Spectrum seems to polarise people into strong pro-and-anti camps over all manner of issues, very few of which seem to have any bearing on whether it is or is not a good micro-computer.

J Blake
61 Queens Road
Tunbridge Wells
Kent

The Spectrum is not all that bad, quite the reverse. The Spectrum is a very good machine. To quote from our editorial of November 4 "Pound for pound the Spectrum still offers one of the best deals in the microcomputer market".

The problems associated with the Spectrum in the main concern its lack of availability and poor quality control. Rectify these problems and the Spectrum is still a very attractive proposition.

As for the rejection of the Spectrum by most local education authorities, I feel this reflects more on the failings of the Department of Industry's "Micros in Primaries" scheme than on the Spectrum.

... and

here's another

After reading the comments in recent copies of your magazine concerning the deliveries of the Spectrum computer and the attitudes of Sinclair Research Ltd, I should like to record my own experience of this company.

A great deal of deliberation

between my sons and myself resulted in an order being placed for a 16K Spectrum last September, knowing that the delivery was likely to be extended. A phone call to Sinclair during the first week in October, after receiving their standard letter of confirmation of order, produced an extremely polite response and a delivery date of the first week in November.

The unit duly arrived on Saturday, November 6. It has worked perfectly since being switched on. The sound is adequate and the colour excellent. The quality of the display on the tv screen is far better than the Vic20 and Dragon on show in the local stores.

As far as I am concerned, the company has kept me informed of their difficulties and have answered my telephone calls with an immediate and polite response. After all, what other company gives you piped music while the telephone operator is busy, and has met the delivery date given to me.

The only letters I have seen printed, to date, are those of an adverse nature and I hope that this letter will help to restore the balance.

MS Tapp
3 Brookside
Cornford Lane
Pembury
Kent

We are only too pleased to publish your letter. Sinclair has undoubtedly come in for a lot of criticism lately and we are glad to be able to show that there is another side to the story. If Sinclair had treated all his customers in the same way, much of this criticism would never have arisen.

Everything in a name

I would just like to make it clear that I, the author of *Scribble for Spectrum* (published November 4), am Terence R Wiley of 1 Watson Gardens, Howdon, Wallsend, Tyne and Wear, and not Anonymous.

TR Wiley
1 Watson Gardens
Howdon
Wallsend
Tyne and Wear

Mum's the word.

Bugged in on Spectrum

Since reading about bugs in the Spectrum in *Popular Computing Weekly*, I have come up with one:

- (1) Switch on Spectrum and press Enter.
- (2) Change the flashing **I** cursor to a **E** cursor.
- (3) Press 6 (yellow) and you will notice that the cursor flashes black and yellow.
- (4) Press Delete (caps shift and 0) and you will notice that the cursor changes back to normal, but is positioned in the middle of the bottom line.

Now try this with other colours and it does not work (nb 9 stands for white and 7 does not change the cursor). Is this just my Spectrum not working, or is it a real Spectrum bug and in that case am I not a clever little brat?

David Edwards
118 Middle Crockerford
Vange
Basildon
Essex

Award goes to Automata

From reading your latest issue, I see other prospective Spectrum owners are fed up with waiting for delivery. My gripe is at the software industry. As you may well know, Microl has been advertising extensively in all the computer press. I ordered one copy of *The Database* on September 6, 1982, with the promise of the dreaded 28 day delivery. Although how it can take any mere mortal more than two weeks to clear a cheque and wrap up a cassette I do not know.

After waiting four weeks, five weeks, six weeks, I received a mass printed letter saying that the program was being re-written and would not be available until mid-December. However, Microl said I would be able to have a refund if I could not wait. Two weeks ago I sent a recorded letter asking for my refund. I am still waiting.

Further to waiting three months for my Spectrum, I have found it a very good machine for my uses. However, a few weeks ago I received

the software catalogue for Sinclair's own products marked *Ex-stock available now*. Four weeks have passed and I have received a card from Sinclair saying my order is being processed. This means that another three-weeks' syndrome is moving on.

But all is not lost. The N M award goes to Automata who market *Pimania*. The software arrived in under 48 hours of posting my order!!!

PS: Lets have some more business programs.

N Murray
39b St Thomas Street
Weymouth
Dorset DT4 8EH

Correct entering a must

Spectrum Disassembler. I believe that the problem your correspondent "Keith Robertson" has experienced with this excellent program is entirely to do with the lower case letters u, v, w, x and y. These must be entered as shown in the listing, since the program uses these lower case letters in argument editing as explained in the text. My version works!

Robin Lucas
84 Woodman Road
Brentwood
Essex

Dragon user's pleasure

I would like to thank you for starting a regular page for Dragon 32 users.

I have just successfully completed my first program which was *Flying Saucers*. I do hope we have plenty more as I am going to place a regular order at my newsagents for your magazine.

Matthew Blackwell
79 Dominion Drive
Collier Row
Romford
Essex

Rest assured. The Dragon page will be a regular feature in our future issues.

If you have an opinion you want to express, or have spotted an error that needs correcting, write to: *Letters*, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2.

Buying a home computer this Christmas?

Come in and try ours and see how they can benefit the whole family.

These personal computers really are for the whole family. For entertainment and education for the children, they're ideal. And there's certainly never been an easier way to tackle all your family accounts, or to help with routine business tasks. So come in and try them out.



Sinclair ZX81 Personal Computer

Amazing value at only £50.03* the Sinclair ZX81 is a remarkably compact and powerful computer.

Buy it now and you'll receive a free 'Space Raiders' cassette.

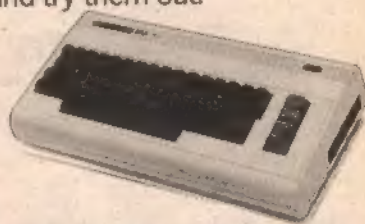
YOURS FREE



Atari 400 Home Computer

This popular home computer is ideal for child entertainment and education and for helping with your personal finances and record keeping. Buy it now for £199.53* and you'll receive a Free Computer Chess Game.

YOURS FREE



Commodore Vic 20 Personal Computer

Choose this easy to use personal computer for your personal accounts, and home entertainment, at a new low price of £160.94*, and you'll get a free 'Mastermind' Cassette

Programme based on the highly successful BBC series.

YOURS FREE

For full details of these and all our other special Christmas offers visit, or telephone, your local Xerox Store. Offers close 31st December 1982.

The Xerox Store

The best shop around for Christmas

Advanced technology products from APPLE, ATARI, CASIO, COMMODORE, HEWLETT PACKARD, PHILIPS, RANK XEROX, SHARP

LONDON 76/77 HIGH HOLBORN W.C.1 TEL: 01-242 9596/7 · 110 MOORGATE EC2 TEL: 01-588 1531/2 · 84 PICCADILLY W.1 TEL: 01-629 0694/5 · BRISTOL BRISTOL & WEST HOUSE, BROAD QUAY TEL: 0272 277828 · CARDIFF SOUTH GATE HOUSE, WOOD STREET TEL: 0222 40118 · GLASGOW 166 HOPE STREET TEL: 041 333 0495 · LIVERPOOL PEARL ASSURANCE HOUSE, DERBY SQUARE TEL: 051-236 7512 · SLOUGH 3/4 WILLIAM STREET TEL: SLOUGH 76956/7.

*All prices inclusive of V.A.T.

Lunar Lander

A new game for 16K Spectrum
and 1K ZX81 by Gordon Cooper

This program runs on a 16K Spectrum. It uses the colour and high resolution plotting facility of the Spectrum to show the spaceship landing on a rugged lunar surface. To land safely will require all your skill. You must angle and fire your rocket to counteract gravity, the downwards fall and sideways drift. For experienced pilots there is an option to have a solar wind, making landing even harder.

To help you land, there is a constantly updated plot of your angle and position on the screen. You also have digital instruments showing your height, speed, drift and remaining fuel. You control the craft by rolling left or right, and deciding the amount of rocket thrust.

To start the game, load the program and issue the Run command. There is an option to display instructions on the screen. Once past these you will find a solar wind blowing. To begin with, use your plasma bomb to stop this. As you become more experienced, you can omit the bomb and have a sidewind to counteract as well.

At this point, the radar scanner will start, with sound and colour effects. Once working, it will display the craft at the top left of the screen, above a rugged surface. Enter *l* or *r* to roll left or right, and *h* hold your angle once you are happy with it. Now enter the number of gallons of fuel you wish to burn this cycle. Start with a number between five and 10. Carry on in this way until you have landed.

Happy landings. If you are not perfect your craft will topple over, or disintegrate while a funeral march plays. A perfect landing needs a speed of less than 4, and a drift of less than 2. You will find it slightly easier to land on level high ground.

To speed the execution of commonly used routines, three subroutines are placed at the beginning of the listing. To pass over these, Line 2 passes control straight to Line 80. Between Lines 80 and 110 is the code to display the instructions.

Lines 110 to 120 determine whether you want a wind to harrass your landing. Lines 122 to 130 start up the radar, with colour and sound effects. Control then passes to the subroutine at Line 13 to plot the moon surface.

The plotting subroutine plots vertical lines of alternate pixels from the bottom of the screen to the randomly varying moon surface held as $v(x)$. This is done by both Lines 20 and 26. The two lines start plotting one pixel apart, at $z = 0$ or 1. This prevents the appearance of horizontal lines over the moon's surface.

Once the surface is plotted, which takes quite a time, control passes to Line 200, where the variables are set up with initial values. Line 235 adjusts the amount of fuel to compensate for the wind and drift. These values are then printed by the subroutine at Line 4. This is at the beginning of the program to speed its execution. It is called 10 times in each fuel burn cycle.

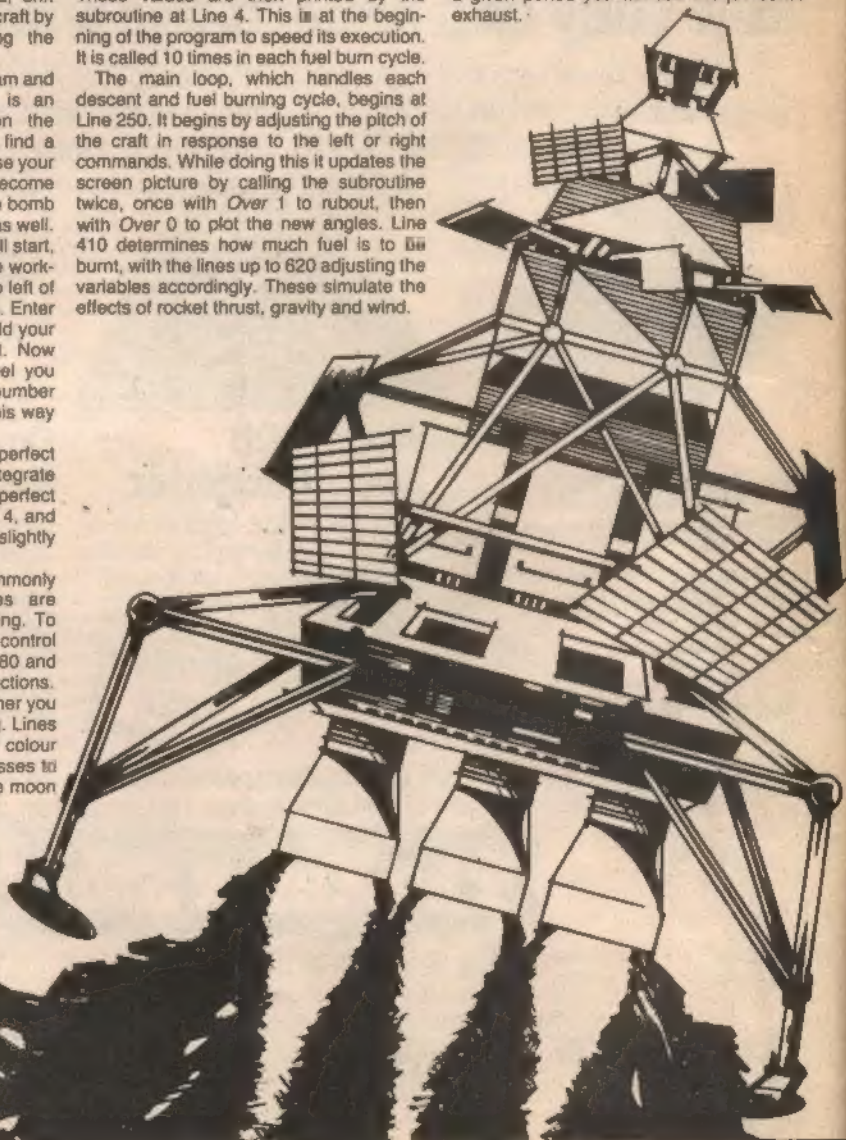
The main loop, which handles each descent and fuel burning cycle, begins at Line 250. It begins by adjusting the pitch of the craft in response to the left or right commands. While doing this it updates the screen picture by calling the subroutine twice, once with *Over 1* to rebout, then with *Over 0* to plot the new angles. Line 410 determines how much fuel is to be burnt, with the lines up to 620 adjusting the variables accordingly. These simulate the effects of rocket thrust, gravity and wind.

Lines 650 to 870 handle the landing. Dependant on speed, you get three victory roll sounds, the craft topples over, or disintegrates. If it breaks up, a funeral march starts at Line 5000, and a cross is placed at the grave by Lines 1050 to 1084.

ZX81 lander

This program is designed to run on a standard 1K ZX81 in *Slow* mode. It produces a moving graphic image of a lunar module descending to the moon surface. The altitude, speed and remaining fuel are also displayed on the capsule's digital instruments.

To start off try entering 5, which will leave the speed the same while using 5 of your precious gallons of fuel. To slow down further enter a larger number, but watch your fuel. If you burn more than 9 in a given period you will see the jet/rocket exhaust.



ORDER
NOW FOR
CONSUMER

**C ★ TECH
SOFTWARE**
present

Is this the end of SPACE INVADERS as we know it?

KONG

An Unbelievable
Video Game from
C Tech. If you
want the latest in
Software then this
is for you.

The Program begins
with a full colour
KONG jumping
across the screen
causing the stairway
to tilt out of place,
then your aim must
run up the ladders
avoiding KONG'S
barrels to rescue
his girl.

The final scene has
KONG and his girl
in full colour, sound
and with M/C subroutines.



PANIC

ISLAND
The Standard
Panic Program
has been modified
to produce
Panic Island,
where you must
bury Monsters
and hunt for
buried Treasure...
before they
hunt you.

KRAZY KONG

plus
Panic Island

CONTROL TECH. SOFTWARE, 104 MARKET ST, HYDE, CHESHIRE.

FOR THE 16K OR 48K

SPECTRUM £5-00

ACCESS & VISA
061-268-8223

FINANCIAL MODELLING CASH FLOW FORECAST BUDGETING

13 columns
number of rows dependent on memory
used

Row and column arithmetic
incl. % calculation
Each row on screen if needed
Printout for columns wanted

Extensive manual

For SPECTRUM 48K only

£40.00 incl.

C.P.S.

14 Britton Street
London EC1M 5NQ

ZX81 GAMES

from
J.K. GREYE SOFTWARE LTD
THE NEW GENERATION SOFTWARE HOUSE

"Without question the finest machine code games available
today"..... J.N. ROWLAND Product Manager for W.H. SMITH.

GAMESTAPE 1 for 1K only £2.95
10 Games incl. ASTEROIDS, UFO, CODE, BOMBER,
GUILLOTINE, KALEIDOSCOPE, etc.
PROBABLY THE BEST VALUE 1K TAPE AVAILABLE.

We've done in 1k, games which some of our competitors
require 16k to do!



GAMESTAPE 2 for 16K only £2.95
*STARFIGHTER Superb machine code Space Battle Set
against a background of twinkling stars, with stunning
explosions - if you can hit the enemy!
*PYRAMID Can you move the Pyramid? Make a mistake and
it will collapse! A Thinkers game.
*ARTIST The ultimate Graphic Designers aid. 8 Directions, 10
Memories, SAVE, COPY, RUBOUT, CLS, etc.

GAMESTAPE 3 for 16K only £2.95

*CATACOMB A Multi-Level Graphics Adventure. Each
level can contain up to 9 Rooms, 8 Passages, 7 Monsters,
Food, Gold, Traps, Platforms, an Exit into the next level,
and there's an infinite number of levels.
NOTE This is NOT one of the necessarily limited text
Adventures as sold elsewhere.
"An excellent addictive game which will keep you amused
for hours"..... **COMPUTER & VIDEO GAMES**



GAMESTAPE 4 for 16K only £4.95
*3D MONSTER MAZE The Game to Top All Others.
Unbelievable Graphics! Can you find your way through the
Maze? The EXIT is there somewhere, but then so is a T REX,
and its after YOU! All in 3D the T REX will actually run
towards you in full perspective! you've never seen anything
like this before!
"3D MONSTER MAZE is the best game I have seen for the
ZX81"..... **COMPUTER & VIDEO GAMES**

"If I had to choose just one programme to impress an audience with the capabilities of
the ZX81, then J.K. Greys 3D MONSTER MAZE would be the one without doubt!"
ZX COMPUTING. "Brilliant, brilliant, brilliant!"..... **POPULAR COMPUTING WEEKLY**

GAMESTAPE 5 for 16K only £2.95

*3D DEFENDER The Ultimate Space Game. Super fast
Machine Code 3D version of the Arcade favourite. You have
to save your home planet from the marauding Alien Spacecraft.
This is all in 3D, your viewscreen shows you the view out
of your fighters cockpit window. The backdrop moves when
you turn, or fly up or down (8 flight directions), just as if you
were really flying! But then YOU ARE! The Enemy Saucers
will actually zoom towards you in 3D, and shoot you if you let them! Your display
includes Score, Shield Strength, Altitude, Proximity, Forward Radar and your viewscreen,
which shows your rotating home planet, backdrop of Stars, Meteors, Explosions,
Plasma Blasts, your Photon Beams, up to 4 Enemy Saucers and of course its all in
full 3D!

"Another 3D winner"..... **SINCLAIR USER**



GAMESTAPE 6 for 1K only £1.95
*BREAKOUT Super Fast Full Screen Display Game. Your
all time favourite with an added twist. See how much Money
you can win and watch the pounds convert to Dollars. All
in Machine Code for Fast Action with 3 Speeds, 3 Bat Sizes
and three angles of rebound! The best BREAKOUT around
and at this price you can't go wrong!

"The best of its kind"..... **WHICH MICRO & SOFTWARE REVIEW**

GAMES MARKED * INCL. MACHINE CODE.

Prices include VAT and U.K. £ & P.

(Add appropriate Postage on Foreign Orders). Cheques/P.O.s to

J.K. GREYE SOFTWARE LTD

Dept PC16, Brendan Close, Oldland Common, Bristol BS15 6OE

CREDIT CARD SALES: FOR INSTANT DESPATCH, BY PHONE ONLY

TEL: 01-930-8232 (9 am - 7 pm)

If you prefer to see before buying, our range of **GAMESTAPES**
are stocked by the following stores:

BUFFER MICROSHOP	374A Sreatham High Rd., London SW18
GAMER	24 Gloucester Rd., Brighton
GEORGES	88 Park St., Bristol, Avon
MICROSTYLE	29 Belvedere, Lansdown Rd., Bath, Avon
MICROWARE	131 Melton Rd., Leicester
SCREEN SCENE	144 St. Georges Rd., Cheltenham, Glos
W.H. SMITH	Over 200 Computer Branches
ZEDXTRA	5 School Lane, Kinson, Bournemouth, Dorset

TRADE & EXPORT ENQUIRIES WELCOME

Software from the stars

David Kelly talks to Ivan Berg about his burgeoning software business.

After ten years in the audio publishing business Ivan Berg has built up an enviable catalogue of the spoken word on cassette.

Albert Einstein, Suzanne York, Paul Eddington and Reginald Bosanquet.

Within 12 months Ivan has applied the same expertise to the software publishing business, with dramatic success. Software publishing now takes up nine tenths of his resources. In short, he knows his personalities.

It all began when Ivan bought a Vic20 microcomputer for his son last Christmas. "I discovered that programming was not the closed book I thought it was," he says. "I thought about us doing some software — after all we have the publishing, audio and cassette know-how and all that was missing was the computer expertise. My brother has been working with mainframes for 15 years and, when I explained my ideas to him, that's when it all started.

"We approached Commodore with a view to producing software in association with them and they were very receptive. Their system was chosen because of its dedicated cassette. We would need to load up to 40K of data for each program, in 6 or 16K blocks, so reliable loading was vital."

Less than four months after their first program went on sale, Ivan and his brother find themselves with a flourishing software catalogue of mainly educational programs designed for both the 8K and 16K Vic20 microcomputers. Their software personalities now include Robert Carrier, Professor Eysenck, Robert Robinson and Patrick Moore.

Part of the company's success in what was an alien industry must be due to its approach — an approach radically different from that customarily taken by software houses.

Ivan takes the traditional computer program production method and turns it inside-out. Under his control, the company treats software like a book — starting with an idea, commissioning an author to write the 'story' of the program and reducing the programmer's role to one of translator, bringing the author's plan to the screen.

First comes the idea. Says Ivan: "I can come up with hundreds of ideas, the problem is choosing the best. A successful project must combine several features — it must have some practical use and be interesting, it must entertain more than one person and, most importantly, it must already have proved to have been popular



Ivan Berg, ideas man.

in another medium, tv, film, radio, magazine or book.

"As far as possible the buying public must recognise the name, title or personality involved. When we first started we looked for books that already existed which would lend themselves to conversion into computer programs. We identified these very quickly — Know Your Own IQ, Know Your Child's IQ, and Know Your Own Personality.

"Because of the reputation we have built up in audio publishing, agents and personalities were aware of us. For the Know Your Own Personality program we had to deal with Penguin Books and all our educational software is produced in association with Hodder and Stoughton Educational. The same thing happened with the BBC. Mastermind seemed to have good possibilities — having a central figure the programme was ideal for conversion to a computer."

Each idea is considered by Ivan and his brother to decide if it can be made to work as a computer program. At this stage Commodore are also involved to endorse the idea in principle.

It is only after the basic plan for the program has been accepted that an approach is made to an author. The person selected will be the author who is best able to write the 'story' of the program — what the user will actually see — and he need not have any knowledge of computer programming.

"At the moment we only have two programmers working for us," explains Ivan. "But, by mid-December we will have at least 10 more on contract and we are in the process of appointing a full-time in-house editor." The programmers must work as closely as possible to the author's original script, and the work must be completed within a strict time schedule — usually within four or six weeks. Then the program is checked for editorial inaccuracies — spelling mistakes and the like — and is de-bugged.

"When this is complete, we take the

program over to Commodore and they also check it for bugs. So far we have had no problems — they have accepted every program we have given them.

"We now have 14 programs on sale, with another 12 in various stages of production. The problem is producing them fast enough. All our programs released through Commodore in August and November are on their second reprint. What has staggered us more than anything has been the runaway success of our GCE 'O' level revision programs.

"Commodore US are licensing our software and we will be changing our educational material to fit in with the American high-school syllabuses.

"I am sure that the Vic20 will continue as long as there is a demand for it. Commodore has now recovered all its tooling costs from its manufacture and there is room for a further price reduction after Christmas — perhaps down pretty close to the £100 mark!

"We are also working on versions of all our programs for the Commodore 64. And we will also be doing a range of 'professional' software packages for it — a Menu Planner for the catering trade, an Interior Designer which designs rooms on-screen and shows the different elevations, and a Professional Money Manager Program. These will be disc-based.



Ivan Berg, linked in a winner.

"We also have a Mind and Body diet and fitness program, an Astronomy program which will display the seasonal star fields, and we shall be looking at law and medicine programs. All these will be available in some form on the Vic20 as well.

"For the future we are looking at electronic banking and at the possibilities of the video-disc/computer combination.

"Unfortunately we cannot be all things to all men. We either expand rapidly and quadruple our production problems or stick with the one company — Commodore.

"I hope we have linked ourselves in a winner! It would have been preferable to have been able to join up with an all-British company, but there wasn't one when we first started. And there still isn't one with a dedicated cassette deck, which we think is vital."

Advent of Owari

Tony Bridge looks forward to Christmas on his Atari.

Christmas 1982 looks like being a very interesting one for the computer consumer. Hard- and software are more plentiful than ever before, and bargains abound. ("Dear Santa, I would like a toy train, a space gun, and a computer...")

The Atari series of computers has a dedicated band of followers, and little wonder, for these machines have a superior graphics capability. There is a very large pool of software for the Atari, and Thorn/EMI has just released, in time for Christmas, some 20 new programs.



A software selection from Thorn/EMI.

These new programs consist largely of games, as most personal software does. All the programs are superbly packaged, as one might expect from a company with connections in the record industry. Sturdy, high-density plastic boxes, reminiscent of videocassettes, protect the cartridge or cassette within. And the instructions come in superbly-designed booklets.

These packages are an object lesson, to other manufacturers, in eye-catching appeal. One day in the not-too-distant future, software will be sold, like books or records, in racks, and all programs will have to be as well-packaged as this present batch.

You will not find any space games in the present collection, nor any adventures (the zappers and axe-getters are, of course, well-catered for by other manufacturers, as we shall see later). No, most of the programs here are "thinking" games.

Let's start by looking at a couple of games usually played in the quiet of the local pub, with a pint and a packet of crisps the only playing aids. *Cribbage* and *Dominoes* are contained on one tape. *Cribbage* (author: J. Smith) is played against the computer, which also takes care of the scoring. The scoring is done on a board, with "pegs", just as in real life. *Dominoes* (author: J. Smith again), too, is played against the computer, which proves a fairly strong opponent in both programs.

The next cassette contains two games that take you right out of the pub. The first, *Owari* (author: A. Howard), is the ancient African game of strategy, in which seeds

or stones are moved around two rows of cups. Two players can play, or one against the computer, and the idea is to capture your opponent's seeds. Sounds simple, but you'll need your wits about you! The other game on this tape is *Bull and Cow* (author: A. Howard), which is just a *Mastermind* game, using little bulls and cows instead of black and white pegs.

Compute 4 (author: K. Buckner) and *Reversi* (author: A. French), are Thorn/EMI's contribution to the endless list of *Connect-4* and *Othello* variants. Good graphics, but no surprises.

Several programs for younger users are present in this new release — and (thank goodness!) they're not "educational". The tape we received, however, contained two programs which both purport to be educational games. The first, *Fizzbuzz* (author: A. French), is a kind of Snap-by-numbers, whilst *Train* (author: as Fizzbuzz) has a little train winding its way through the hills, dragging a series of number-coaches behind it. You are expected to choose correctly the next number in the series from those above the scene. At higher levels the problems can become tough even for older players (all right, I admit to being slumped more than once!). A cunning user, however, merely needs to run through each option until the right answer is hit upon by luck. No explanation is given as to how the correct solution should be reached. Therefore, a mere diversion, and not a useful educational tool.

Moving on to reaction games, we find



From Nigeria, an ancient game of strategy.



Tony Bridge: contentment

Snooker and *Billiards*. Very good graphics in both programs, but a rather awkward two-operation shooting method. First the aim is set up (and this in itself can be rather hit-and-miss, excuse the pun, with the conventional joystick), then the strength of the shot is estimated. Occasionally, one becomes so overjoyed at finally getting the aim right, that the "fire" button is pressed before the strength-meter is properly set, and the ball trickles forward a mere couple of inches, or goes cannoning around the table. However, good sound and graphics make for a good simulation.

The final game program in this batch of releases is *Kickback* (author: A. French, again), which comes in cartridge form. Based, I would say, on *Breakout*, the graphics nevertheless remind me of American football, with an oval-shaped ball being kicked around from man to man. The idea is to get the ball from your man at the bottom of the screen, through all the defenders, into the opposing goal. Despite excellent graphics, and a satisfying flash-and-clang as the ball rebounds from a player, the game very soon becomes boring.

Two more cartridges wind up Thorn/EMI's Christmas release. *Jumbo Jet Pilot* (author: H. Samara) is, as the name suggests, a *Flight Simulator* program: as a real fan of these, I approached this cartridge with anticipation.

As one has come to expect from an Atari program, the graphics are outstanding. After selecting your skill level (Capt. Bill Smith of BA can start at 5, the rest of us, at 1), you can look at your instrument panel, which consists of an array of dials and information. A very comprehensive instruction book will help you decipher these, however, and then you can take off.

Your mission is to navigate your Jumbo to the landing strip at the other side of the map. The simulator is broadly realistic in its flight characteristics (can you loop the loop in a Jumbo?), but ultimately, I'm afraid, boredom sets in — a couple of hours needed to get even halfway across the map, and straight and level flight at this sort of time-scale is fairly unexciting. As a tyro, I could be doing something wrong, of course!

Submarine Commander (author: D Lock) is my personal favourite from this present release. The player is put in charge of a submarine patrolling the Mediterranean in search of enemy ships to destroy (from the saloon bar to a Jumbo submarine — anything can happen with an Atari!).

At the start, the instrument panel is displayed. Fully as complex as the Jumbo's, things are nevertheless made clear in the instruction book. A map of the area may also be called up, which shows the sub's position and that of all the shipping. Once on an attack course, a periscope view may be selected. Of course, you are not allowed merely to skulk around shooting off torpedoes the enemy wily-nilly —



Jacking it in.

they will be firing back with gusto (also with large calibre shells, and depth-charges).

When you are lucky enough to get a hit with your torpedo, you will see, through your periscope, the unfortunate vessel stilling you as it sinks beneath the waves

... The score given at the end of the game is dependent upon tonnage sunk, number of torpedoes used, time taken and so on. The graphics in this program are outstanding, even in such exalted company.

From Synapse Software (wish I'd thought of that name) comes *Shamus* (author: William Matage), a combination of arcade and adventure. Your little Shamus has to negotiate twisting corridors in search of The Key. He is not alone — Spiral Drones and Snappers, mention only two of the 'horrible beasts, come after your man in gangs, and which of course must be shot down.

Scattered around the corridors are various treasures like Extra Lives, Keys and Mystery Question Marks, which can be picked up or left. Once the beasts have been disposed of, however, the dreaded Shadow immediately comes out of hiding and rushes towards you. And he will kill your man unless you get him off to the next screen fairly sharpish!

Scott Adams' Adventure International is the company responsible for *Preppie* (author: Russ Wetmore). This is the game which frog-lovers everywhere finally get their revenge. You control a little preppie who, for some reason, has been sent to retrieve golf balls from the middle of hazards such as you will never see at your local municipal course. The road and river that have to be crossed are, naturally, filled with various speeding objects ready to squash, throw, or eat you if you mis-step.

In the lower levels, manic little men are intent upon rolling the road, and these can squash you very graphically, to the accompaniment of a Funeral March. Later levels present you with speeding golf carts, bulldozers, snapping alligators, and, the Froggy Revenge, a giant frog which will jump on you, given half the chance. The music (guaranteed to drive you crazy



Tony Bridge, trawling the depths.

within about half a minute), sounds and incredible graphics of this program make it entirely addictive.

Finally, after the preceding intellectual stimulation, a good old, no-nonsense, Arcade Game: *Caverns of Mars*, from Atari Program Exchange (APX). This turns out to be a vertical version of *Scrambler*, and apparently has been a firm favourite of Atariists for some months. At each of the four skill levels, your ship has to negotiate ever more airlocks, and zap more little nasties (boy, are they difficult to shoot!), until the re-energising base can be reached. A time limit is then set, which you have to renegotiate all the airlocks and escape.

Summary

These final three games highlight, at the same time, the similarities and the differences between Thorn/EMI's new collection, and those of the smaller software producers.

The main similarity is excellent graphics. In fact, it would be hard to program poor graphics on an Atari, and it is this feature, above all others, which persuades people to part with larger sums of money than for other computers (the gap between the graphics of the Atari and those of its lower-priced competitors is, however, narrowing all the time).

The outstanding difference between the Thorn/EMI catalogue, and the others reviewed here, is addictiveness. Not one of T/E's games, including the excellent *Submarine Commander*, has this quality, while the three last games all have it (spades (I am going to defeat this game — just one more go).

At the prices charged universally for Atari software, games must stand up to being played time and again. Unfortunately, the value marks for all the programs suffer from the high cost involved. I cannot believe that it is necessary to charge an average of £20 for what are mostly very pedestrian programs. *Jumbo Jet Pilot*, at £30, is outrageously over-priced — a similar program from Psion/Sinclair for the Spectrum is just about as good, and costs mere £10. "A smaller market," I hear you say? Well, yes, but until Atari bring down the price of their hardware, the market will remain smaller.

Firm	Program	Cassette or Cartridge	Cost	Value (1-10)
Thorn/EMI	<i>Cribbage & Dominoes</i>	Cassette	£14.95*	7
	<i>Snooker & Billiards</i>	Cassette	£19.95*	6
	<i>Pool</i>	Cassette	£19.99*	6
	<i>Kickback</i>	Cartridge	£29.99*	4
	<i>Submarine Commander</i>	Cartridge	£24.50*	7
	<i>Jumbo Jet Pilot</i>	Cartridge	£29.95*	3
	<i>Figure Fun</i>	Cassette	£14.99*	6
	<i>Compute 4 & Reversi</i>	Cassette	£14.99*	4
	<i>Owari & Bull and Cow</i>	Cassette	£14.99*	4
Atari (APX)	<i>Caverns of Mars</i>	Cassette	£24.50	8
Adventure Int	<i>Preppie</i>	Cassette	£20.00	9
Synapse Software	<i>Shamus</i>	Cassette	£21.80	9

*Prices can vary depending on the retailer.

INTEREST FREE

on Atari, VIC20, Commodore 64 and

If your order contains over £120 worth of computer hardware apply now for interest free credit by telephoning: Mail-order: (0702) 552911. London Shop: 01-748 0926. Birmingham Shop: 021-356 7292. Southend Shop: 0702 554000 or write to P.O. Box 3, Rayleigh, Essex SS6 8LR.

You pay 10% down, then 10% per month for a further nine months (to nearest penny). Example: VIC20 Colour Computer. Cash Price £169.99. Credit terms: £16.99 down then £17 per month for nine months: Total £169.99. Credit quotations on request.

THE NEW COMMODORE 64

The incredible new computer from Commodore comes with 64K RAM fitted! Plus 16 colours, hi-res graphics, 320 x 200 pixels, 40 columns by 25 lines, Z80 micro processor can be added — that means you can run CP/M software, 8 independently movable Sprites with collision detection, and a sound generator with 3 voices, 4 wave-forms, envelope and filter to rival some dedicated music synthesisers. And all this at the most incredible price ever. (AF56L) Only £339.00

DRAGON 32



The amazing new British computer with a full-travel standard keyboard, a 16-bit microprocessor, 32K RAM fitted (expandable to 64K and later to 256K!), 9 colours, hi-res graphics and Microsoft extended colour BASIC (the very best BASIC to learn with). It can be used with virtually any ordinary cassette recorder, it has a printer interface (Centronics-type), joysticks are available and it's incredible value for money. (AF57M) Only £199.50

THE AMAZING ATARI COMPUTERS

4 Consoles Available:

Atari 400 with 16K RAM (AF36P) £249.95

Atari 400 with 48K RAM (AF37S) £319.00

Atari 800 with 16K RAM (AF02C) £399.00

Atari 800 with 48K RAM (AF55K) £490.00

* All above with BASIC & handbooks

Other hardware

Cassette Recorder (AF28F) £50.00

Disk Drive (AF06G) £299.95

Thermal Printer (AF04E) £265.00

Epson MX800 Mk III (AF38R) £399.95

Epson MX800 T Mk III (AF40T) £447.35

Printer Interface for 400 (AF43U) £59.95

Printer Interface for 800 (AF42V) £59.95

Interface Module (AF29G) £135.00

Varsawriter (AF43W) £199.95

16K RAM Module (AF08J) £55.00

48K RAM Module for 400 (AF44X) £125.35

48K Upgrade for 400 (AF45Y) £75.00

Floppy Disk (VX07U) £2.50

Le Stick (AC45Y) £24.95

Joystick Controllers (Pair) (AC37S) £13.95

Paddle Controllers (Pair) (AC30H) £13.95

For full details ask for our hardware leaflet (XN54J) SAE appreciated

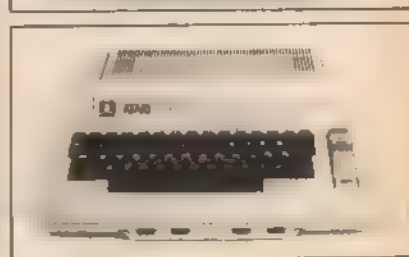
JOIN THE U.K. ATARI COMPUTER OWNERS' CLUB

An independent users' group. Four issues of the club magazine for only £3.00! Address your subscription to Ron

Issue 1 of the club magazine featured a tutorial on character set redefinition and contained a collection of demonstration and

games programs and lots more. Issue 2 featured a tutorial on player-missile graphics, an article about graphics on computers, a

selection of members' contributions to the program library and much more



THE FINEST SELECTION OF ATARI SOFTWARE

Teach Yourself Programs

Comprehensive French	M 10K 1444N £39.95
Comprehensive German	M 16K 1444N £39.95
Comprehensive Spanish	M 16K 1444N £39.95
Comprehensive Italian	M 16K 1444N £39.95
French Tutoring	2C 16K 1444N £19.95
Spanish Tutoring	2C 16K 1444N £19.95
Italian Tutoring	2C 16K 1444N £19.95
German Tutoring	2C 16K 1444N £19.95
Basic 1.0 Program	1C 16K 1444N £19.95
Basic 2.0 Program	1C 16K 1444N £19.95
Basic 3.0 Program	1C 16K 1444N £19.95
Basic 4.0 Program	1C 16K 1444N £19.95

Learn Programming

Introduction to Programming 1	1C 16K 1444N £19.95
Introduction to Programming 2	1C 16K 1444N £19.95
Introduction to Programming 3	1C 16K 1444N £19.95
Introduction to Programming 4	1C 16K 1444N £19.95
Introduction to Programming 5	1C 16K 1444N £19.95
Introduction to Programming 6	1C 16K 1444N £19.95
Introduction to Programming 7	1C 16K 1444N £19.95
Introduction to Programming 8	1C 16K 1444N £19.95
Introduction to Programming 9	1C 16K 1444N £19.95
Introduction to Programming 10	1C 16K 1444N £19.95

Page 1 Entry

Page 1 Entry	1C 16K 1444N £19.95
Page 1 Entry	1C 16K 1444N £19.95
Page 1 Entry	1C 16K 1444N £19.95
Page 1 Entry	1C 16K 1444N £19.95
Page 1 Entry	1C 16K 1444N £19.95
Page 1 Entry	1C 16K 1444N £19.95
Page 1 Entry	1C 16K 1444N £19.95
Page 1 Entry	1C 16K 1444N £19.95
Page 1 Entry	1C 16K 1444N £19.95
Page 1 Entry	1C 16K 1444N £19.95

Business Programs

Business Programs	1C 16K 1444N £19.95
Business Programs	1C 16K 1444N £19.95
Business Programs	1C 16K 1444N £19.95
Business Programs	1C 16K 1444N £19.95
Business Programs	1C 16K 1444N £19.95
Business Programs	1C 16K 1444N £19.95
Business Programs	1C 16K 1444N £19.95
Business Programs	1C 16K 1444N £19.95
Business Programs	1C 16K 1444N £19.95
Business Programs	1C 16K 1444N £19.95

Adventure Games

Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95

Adventure Games

Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95

Adventure Games

Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95
Adventure Games	1C 16K 1444N £19.95

OPEN FORUM

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Grand Prix

on Vic 20

This is a simple game to play and is basically a race against time. Don't be put off by that, because although it is a fairly basic game there is still room for expansion.

The game involves controlling a character anti-clockwise around a set track (the character can be changed by changing the poke values ■ lines 260, 330, 390 and 800). If you hit a wall you are sent back to

the beginning of the lap. There are also hidden oil slicks on the track, and these also cause you to spin and crash.

The whole course is three laps long. The program fits into the 3.5K which is available on the unexpanded Vic. The program also makes use of the Vic's auto-repeat function, which is not widely known about.

The problem of how to get the computer to recognise whether the car has crashed or not was solved by making it check the 4 characters around the car and if any of them is part of the wall its location is stored for later reference.

Once the operator has moved the car its present location is compared with those stored previously, and if they match up the car has crashed because it is now in the same position as part of the wall. The program takes full advantage of the sound and colour facilities available on the Vic.

Program notes

Line(s)	
1 to 9	Set counters and variables
10 to 250	Draw the track.
250 to 260	Draw the car on the screen
261 to 265	Check the area around the car for walls.
266 to 356	Check keyboard for keys being pressed and set volume.
390 to 405	Check if the car has crossed the finish line and if it has print the number of laps completed
505 to 530	Make explosion sound.
640 to 750	If three laps have been completed make the sound to tell the operator and print the time taken to complete the course
800 to 820	Refill the holes in the wall.
1000 to 1140	Print the instructions to the player

```

0 009081000
1 POKE36879,100
2 V=13 X=3
3 POKE368,255
4 POKE36878,15
5 T1$="000000"
6 POKE36879,100
7 PRINT"■"
8 A1=0 A2=0 A3=0 A4=0
9 DIMA(10)
10 PRINT"■"
12 PRINT"■"
20 PRINT"■"
30 PRINT"■"
31 PRINT"■"
40 PRINT"■"
50 PRINT"■"
60 PRINT"■"
70 PRINT"■"
80 PRINT"■"
90 PRINT"■"
100 PRINT"■"
110 PRINT"■"
120 PRINT"■"
130 PRINT"■"
140 PRINT"■"
150 PRINT"■"
160 PRINT"■"
180 PRINT"■"
190 PRINT"■"
200 PRINT"■"
210 PRINT"■"
220 PRINT"■"
230 PRINT"■"
241 POKE36878,5
250 PRINT"■"
259 A(1)=8164-13*22+3 V=13 X=3
260 POKE8164-V*22+X,94
261 A1=0 A2=0 A3=0 A4=0 A5=0 A6=0 A7=0 A8=0
262 IFPEEK(8164-V*22+X+1)=160 THEN A1=8164-V*22+A5+X+1
263 IFPEEK(8164-V*33+X-1)=160 THEN A2=8164-V*22+A5+X-1
264 IFPEEK(8164-(V-1)*22+X)=160 THEN A3=8164-(V-1)*22+A7+X
265 IFPEEK(8164-(V+1)*22+X)=160 THEN A4=8164-(V+1)*22+A5+X
266 POKE36874,120
270 GET#0
280 POKE8164-V*22+X,32
290 IFA$="U" AND Y=1 THEN Y=Y+1 P=2
300 IFA$="R" AND Y=2 THEN Y=Y+1 P=7
310 IFA$="N" AND X=1 THEN X=X-1 P=3
320 IFA$="M" AND X=2 THEN X=X+1 P=10
321 POKE36878,P
330 POKE8164-V*22+X,94
340 IFA1=8164-V*22+X=8164-V*22+X THEN 500
345 IFA2=8164-V*22+X=8164-V*22+X THEN 500
350 IFA3=8164-V*22+X=8164-V*22+X THEN 500
355 IFA4=8164-V*22+X=8164-V*22+X THEN 500
360 IFAV=8164-V*22+X=8164-V*22+X THEN 500
365 FORT=2705

```

```

390 IFPEEK(8164-16*22+T)=94 THEN LP=LP+1 IFLP=3 THEN 640
400 NEXT
405 PRINT"■ LAPS="LP
410 GOTO260
500 FORT=10T019,
581 FORT=10T012
582 IFV=9 AND X=1 THEN 260
583 NEXT NEXT
584 IFV=9 AND X=2 THEN 260 IFV=9 AND X=4 THEN 260
585 POKE36877,220 FORT=15T01STEP-1
586 POKE8164-V*22+X,42
590 POKE36878,U
590 FORT=1T050 NEXT
590 NEXT
590 POKE36877,0
590 GOTO800
640 POKE36878,15
650 Q=Q+1 IFQ=18 THEN 700
655 POKE36876,220
660 FORT=1T050
665 NEXT
666 POKE36876,0
670 GOTO650
700 PRINT"■ YOU HAVE COMPLETED 3 LAPS IN ■ TIME
OF ■ POKE36874,0 D=0
710 PRINT
720 PRINT"■ M/S"
730 PRINTT1$
740 FORT=1T05000 NEXT
750 CLR GOTO1
800 POKE(1),94
810 POKE1,160 POKE2,160 POKE3,160 POKE4,160
815 POKE8164-V*22+X,160
820 GOTO259
1000 PRINT"■ *****"
1010 PRINT"■ GRAND PRIZ"
1020 PRINT"■"
1030 PRINT"■ IN THIS GAME YOU ARE THE DRIVER OF
A FORMULA 1 RACING CAR"
1040 PRINT"■ TO CONTROL YOUR CAR USE:"
1050 PRINT"■ Q TO MOVE UP"
1060 PRINT"■ A TO MOVE DOWN"
1070 PRINT"■ M TO MOVE LEFT"
1080 PRINT"■ N TO MOVE RIGHT"
1090 PRINT"■ HIT ANY KEY"
1091 PRINT"■ WATCH OUT FOR OIL ON THE ROAD, IT IS
DANGEROUS"
1095 PRINT"■ *****"
1100 GETC: IFC$="" THEN 1100
1110 PRINT"■"
1120 PRINT"■ YOU HAVE TO COMPLETE 3 LAPS OF THE
COURSE AS FAST AS POS."
1130 FORT=1T03000 NEXT
1140 RETURN

```

Grand Prix
by Brandon James

Spilkey

on Vic 20

This program is written for a Vic20 with a Super Expander fitted. It uses the Draw command to its fullest potential. When the program is run the title page is shown for a few seconds and then a choice of three kinds of spikes, ranging from fine spikes to

course spikes are shown. The user then chooses the required spike width.

The user then inputs the number of spikes which is going to be displayed. The spikes will then be displayed with a small delay between each spike. After all the spikes have been displayed, the program is re-run.

Program notes:
Line 5: freeze to warmer case. GOSUB subroutine 270

{setting up program). *For-Next* loop for drawing certain numbers of spikes.

Line 2D: setting up random number, setting up random width between spikes.

Lines 30-230: drawing spikes from top left-hand corner going clockwise around the screen
Line 240: delay loop

Line 250. Clears the screen

Line 260: end of loop, re-run the program

Line 370-379, display title page, display logo

Lines 390-400: choosing gap between each spike

Lines 400-410: choose how many spikes to be shown.

```

0 REM SPIKEY
1 REM(C) R.HAYNES 1982
5 PRINTCHR$(8):GOSUB270:FORRI=0TO5
10 GRAPHIC3
20 N=1+INT(RND(1)*14):W=P+INT(RND(1)*RN)
30 COLOR0,0,N,N
40 T=0
50 DRAWN,T,0TO511.5,511.5
60 T=T+W
70 IFT=1023THEN90
80 GOTO50
90 T=0
100 DRAWN,1023,TT0511.5,511.5
110 T=T+W
120 IFT=>1023THEN140
130 GOTO100
140 T=1023
150 DRAWN,T,1023TO511.5,511.5
160 T=T-W
170 IFT<=0THEN190
180 GOTO150
190 T=1023
200 DRAWN,0,TT0511.5,511.5
210 T=T-W
220 IFT<=0THEN240
230 GOTO200
240 FORDE=1TO3000:NEXT
250 SCNCLR
260 NEXT:RUN

```

```

270 GRAPHIC0
280 PRINT "1:000000":POKE36879,10
290 A$="          SPIKEV          (C)R.
      HAYNES 1982          THORPE BAY
300 B$=" ESSEX.":A$=A$+B$
310 FOR T=1 TO LEN(A$):PRINT MID$(A$,T,1);
      :FOR I=0 TO 65:NEXT I,T
320 FOR D=1 TO 5000:NEXT
330 PRINT "J"
340 A$="1:FINE SPIKES00002:MEDIUM
      SPIKES00000003:COURSE SPIKES00000
      000000:INPUT CHOICE"
350 FOR I=1 TO LEN(A$):PRINT MID$(A$,I,1);
      :FOR T=0 TO 65:NEXT T,I
360 INPUT A
370 IFA=1 THEN RN=25:P=5
380 IFA=2 THEN RN=200:P=30
390 IFA=3 THEN RN=1023:P=205
400 IFA<1 OR A>3 THEN 330
410 FOR I=1 TO 38:PRINT MID$("00:INPUT NUMBER
      OF SPIKES0000 TO BE SHOWN",I,1);
      :FOR T=0 TO 65:NEXT T
420 NEXT I
430 INPUT S
440 RETURN

```

Spikey

by Robin Hayes

Defender

on Spectrum

This is a version of the popular arcade game. You must shoot down the oncoming alien, because if he passes you, you are obliterated. Sounds easy? You only have 20 shots per 10 aliens! If you accomplish this then you have an extra 20 shots.

Line 55 is a graphic A; 310 is graphic B and C and 420 is graphic D and E. The program is very fast for Basic, eg, the landscape movement and the firing rate.

When you are killed, press *Break* and then press *R* (*Run*) and *Enter*. My highest score is 14.

```

1 FOR f=0 TO 7: POKE USR,"b"+
f,AND 255: POKE USR,"c"+f,AND 255
2 NEXT f
3 LET i=0: LET b(=28
4 LET s=0: LET d=0
5 FOR f=0 TO 7: READ a: POKE
USR,"a"+f,a: NEXT f: DATA 238,5,
4,255,255,4,5,255
6 FOR f=0 TO 7: READ x,y: POKE

```

[illegible]

```

415 PRINT AT d, i, " " LET i=i-
416 IF i=0 THEN GO TO 428
417 LET d=d+1 IF i=5 THEN L
418
419 IF d=1 THEN LET d=1
420 IF d=10 THEN LET d=10
421 PRINT AT d, i, " " RETURN
422
423 AT 10,10 "INVOICED SCORE"
424 FLASH " "
425 GO SUB 415 TO 510
426 LET b1=b1-1 GO TO 510
427 IF b1=1 GO TO 510
428 GO TO 500
429 PRINT AT 10,10, " " IF d=
430 THEN GO TO 750
431 PRINT AT x, i, " " PRINT AT x,
432
433 RETURN
434
435 PRINT AT 1,1,b1 TO 1)
436 1) FOR x=1 TO NEXT
437
438 PRINT AT 1,1,c1 TO 1)
439 LET c=c1
440 LET i=i- GO TO 300
441
442 FLASH " "
443 AT 10,10 "NO
444
445

```

Defender

by Nick Wilson

Tips

on ZX81

Hobbyists, on purchasing the ZX81, will have found its slow Basic and lack of facilities very limiting. The former can only be overcome by using machine code, but for those content with Basic, here are a few programming tips for use in longer programs.

1. The first of these is similar to the Spectrum's *Attr* or *Screen\$*. It is a way of addressing any square on the screen.

The system variable D-FILE contains two bytes, showing where the memory mapped screen starts (it moves around the memory). So by *Peeking* D-FILE and adding the displacement of the required position, it is possible, in effect, to read data from the screen. This is how it is done.

```
IF PEEK (PEEK 16396 + 256 + I + PEEK 16397) +
33 * line + position) = CHR$(code) THEN
```

If you want to use this a lot in a program then set a variable at the start:

```
LET DFS = (PEEK 16396 + 256 + PEEK 16397) + 1
```

Then to use it just type:

```
IF PEEK (DFS + 33 * line + position) = CHR$(code) THEN
```

On a ZX81 with less than 3.5K this does not work, since any line without a character on it is not memory mapped.

2. Passing variables to subroutines. Imagine you are writing a game in which

the player moves around the screen chased by two or more monsters. To move the monsters you need two or more almost identical subroutines, which could well be something like 30 lines long — that means 60 lines at least. Instead of doing that, you could use this technique. Here the variables M11 and M12 are the co-ordinates of the first monster and the variables M21 and M22 are the co-ordinates of the second:

```
LET M1 = M11
LET M2 = M12
GOSUB routine
LET M11 = M1
LET M12 = M2
```

```
•
•
•
```

```
LET M1 = M21
LET M2 = M22
GOSUB routine
LET M21 = M1
LET M22 = M2
```

The routine can alter M1 and M2 as necessary. The new values are always assigned to the correct variables.

3. In a program you may want to use the bottom two lines of the screen. To do this, at the start use this statement, which makes the bottom two lines available for *Printing*.

```
POKE 16416,0
```

Beware of *Input*, which clears the bottom two lines; report codes, which overwrite the first few positions of line 24 and *Scroll*, which crashes the system.

4. The effect of *Run* is to go through the program in the computer and clear out all the variables. Hence, when programming a game with a "high score" feature it is necessary either to use *GOTO* 1 or to employ a *Goto* instead of *Stop* at the end of the program.

Here is another way. The very first line of the program should be:

```
REM space
```

This saves one byte of data to hold a score of up to 255. Here is how to change the byte for a "high score" (the score \blacksquare S).
IF S > PEEK 16514 THEN POKE 16514, S

To print it:

```
PRINT PEEK 16514
```

This makes a safe "high score" which is proof against *RUN* and even against *Clear*. If you *List* the program you will find another character in the place of the space. Look it up in the Sinclair.

To have a high score of more than 255 is a little harder. The *REM* statement should contain two spaces. To use it:

```
9000 IF S < PEEK 16514 + 256 - PEEK 16515
```

```
THEN GOTO 9030
```

```
9010 POKE 16514, INT (S/256)
```

```
9020 POKE 16515, S - 256 * (INT (S/256))
```

```
9030 PRINT "HIGH SCORE "; PEEK 16514 + 256 -
```

```
PEEK 16515
```

Again, this has its limits if the score is over 65535.

by Michael Brookes

Graphics utility

on BBC Micro

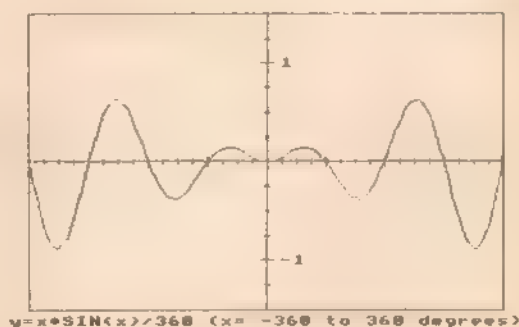
One of the strong points of BBC Basic is the facility to define procedures which take all the work out of routine operations and

add polish to the most mundane programs. I have put together a package of the most often used procedures which should be particularly handy for anyone producing output in the form of graphs.

A full explanation of the program is

contained in *Rem* statements which can be deleted if required, and I have included a short program which uses most of the procedures as an example. The digitised procedure can be used to plot points and draw simple figures.

```
100 REM *****
110 REM ** Simple Example **
120 REM *****
130 MODE4:PROCinit
140 PROCshow(50,1200,50,950)
150 PROCscale(-4*PI,4*PI,-1.5,1.5)
160 PROCaxes(0,0,PI/4,0.25,4,-.025,PI/16)
170 PROCframe:PRINTTAB(0,31)"y=x*SIN(x)/360 (x = -360 to 360 degrees)"
180 PROClabel(0,1.05,"1"):PROClabel(0,-.95,"-1"):
    PROCmove(0,0)
190 FOR angle=-PI/4 TO PI/4+.1 STEP PI/16
200   PROCdraw(angle,angle/PI/4*SIN(angle))
210 NEXT angle
220 PROCdigitize(0,0,cross)
```



Turn to page 20

```

30000 REM *****
30001 REM ** Graphic Subroutines **
30002 REM ** David Elliot 1982 **
30003 REM *****
30004 :
30005 :
30006 REM      Explanation of Commands:
30007 REM
30008 REM PROCinit                Initialise Graphics
30009 REM PROCdraw(X,Y)          Draw line to X,Y
30010 REM PROCset(X,Y)          Set point at X,Y
30011 REM PROCmove(X,Y)         Move to X,Y
30012 REM PROCshow(Xmin,Xmax,Ymin,Ymax) Define graphics window using standard
30013 REM                               Graphics co-ordinates (1280,1024)
30014 REM PROCscale(Xmin,Xmax,Ymin,Ymax) Changes the X and Y scaling to fit the
30015 REM                               Previously defined graphics window
30016 REM PROCframe              Draws a frame around the graphics
30017 REM                               window
30018 REM
30019 REM PROCaxes(intX,intY,spaceX,spaceY,majorX,majorY,xsize,ysize)
30020 REM      Draws a pair of axes on the Graphic screen crossing at (intX,intY)
30021 REM      with ticks along the X and Y axes every 'spaceX' and 'spaceY'
30022 REM      respectively.

30023 REM      Every 'majorX' and 'majorY' interval it draws a tick twice the size
30024 REM      The size of the tick is defined by 'xsize' and 'ysize' for the
30025 REM      X and Y axes respectively.
30026 REM      Note: If 0 is specified for spaceX or spaceY the respective ticks
30027 REM      are not drawn.
30028 REM
30029 REM PROClabel(X,Y,A$)        Prints out label 'A$' at X,Y.
30030 REM PROCdigitize(X,Y,type)  Displays a crosshair at X,Y and allows
30031 REM                          the user to move it around using the
30032 REM                          cursor keys until <RETURN> is pressed.
30033 REM                          The co-ordinates of the point are
30034 REM                          returned by the 'cursorx' and 'cursory'
30035 REM                          variables.
30036 REM                          The cursor type can be either be
30037 REM                          'fullscreen' or 'cross'
30038 REM                          .E.G. PROCdigitize(0,0,cross)

30039 REM      End of explanation
30040 REM ** Start of the real program
30041 REM
30042 REM Functions for internal use
30043 DEF FNpointx(x)=x*scalex
30044 DEF FNpointy(y)=y*scaley
30045 :
30046 REM ** Initialise Graphics **
30047 :
30048 DEF PROCinit
30049   VDU 20,26,29,0;0;0;0;0;0;
30050   scalex=1:REM Set screen to normal
30051   scaley=1
30052   cursorx=0:REM move cursor to 0,0
30053   cursory=0
30054   minx=0:maxx=1279:miny=0:maxy=1023
30055   fullscreen=TRUE:cross=FALSE
30056 ENDPROC
30057 :
30058 REM ** Draw Line **
30059 :
30060 DEF PROCdraw(X,Y)
30061   DRAW FNpointx(X),FNpointy(Y)
30062 ENDPROC
30063 :
30064 REM ** Draw point **
30065 :
30066 DEF PROCset(X,Y)
30067   PLOT 49,FNpointx(X),FNpointy(Y)
30068 ENDPROC
30069 :
30070 REM ** Move to a point **
30071 :
30072 DEF PROCmove(X,Y)
30073   MOVE FNpointx(X),FNpointy(Y)
30074 ENDPROC
30075 :
30076 REM ** Define graphics window **
30077 :
30078 DEF PROCshow(minX,maxX,minY,maxY)
30079   Define window
30080   VDU 24,minX,minY,maxX,maxY;0;0;0;0;
30081   Store screen limits
30082   minx=minX:miny=minY
30083   maxx=maxX:maxy=maxY
30084 ENDPROC
30085 :
30086 REM ** Define scale **
30087 :
30088 DEF PROCscale(minX,maxX,minY,maxY)
30089   LOCAL A,B,C,D
30090   REM work out conversion scale
30091   A=(maxx-minx)/(maxX-minX)
30092   B=(maxy-miny)/(maxY-minY)
30093   REM Redefine graphics origin
30094   VDU 29,minx-(A*minX);miny-(B*minY)
30095   ;0;0;0;0;

```



```

30096 scalex=A
30097 scaley=B
30098 REM set screen limits
30099 minx=minX:miny=minY
30100 maxx=maxX:maxy=maxY
30101 ENDPROC
30102 :
30103 REM ** Draw frame around screen **
30104 :
30105 DEF PROCframe
30106 PROCmove(minx,miny):PROCdraw(maxx,
miny)
30107 PROCdraw(maxx,maxy):PROCdraw(minx,
maxy)
30108 PROCdraw(minx,miny)
30109 ENDPROC
30110 :
30111 REM ** Draw axes **
30112 :
30113 DEF PROCaxes(intX,intY,spaceX,
spaceY,majorX,majorY,xsi
30114 LOCAL A,BX,C,D
30115 REM Draw axes
30116 PROCmove(minx,intY)
30117 PROCdraw(maxx,intY)
30118 PROCmove(intX,miny)
30119 PROCdraw(intX,maxy)
30120 REM Draw Horizontal ticks
30121 IF spaceX=0 THEN 30135
30122 BX=0
30123 FOR A=intX TO maxx STEP spaceX
30124 IF (BX MOD majorX)=0 THEN
C=xsize*2 ELSE C=xsize
30125 PROCmove(A,intY-C)
30126 PROCdraw(A,intY+C)
30127 BX=BX+1
30128 NEXT A
30129 BX=0
30130 FOR A=intX TO minx STEP
-spaceX
30131 IF (BX MOD majorX)=0 THEN
C=xsize*2 ELSE C=xsize
30132 PROCmove(A,intY-C):PROCdraw
(A,intY+C)
30133 BX=BX+1
30134 NEXT A
30135 :
30136 REM Draw Vertical ticks
30137 IF spaceY=0 THEN 30148
30138 BX=0
30139 FOR A=intY TO maxy STEP spaceY
30140 IF (BX MOD majorY)=0 THEN
C=ysize*2 ELSE C=ysize
30141 PROCmove(intX-C,A):PROCdraw
(intX+C,A)
30142 BX=BX+1:NEXT A
30143 BZ=0:FOR A=intY TO miny STEP
-spaceY
30144 IF (BZ MOD majorY)=0 THEN
C=ysize*2 ELSE C=ysize
30145 PROCmove(intX-C,A):PROCdraw
(intX+C,A)
30146 BZ=BZ+1
30147 NEXT A
30148 ENDPROC
30149 :
30150 REM ** Print label **
30151 :
30152 DEF PROClabel(X,Y,A$)
30153 REM Move to graphics point
30154 MOVE FNpointx(X),FNpointy(Y)
30155 REM Join cursors and print label
30156 VDU 5
30157 PRINT A$;
30158 VDU 4
30159 ENDPROC
30160 :
30161 REM ** Digitize point **
30162 :
30163 DEF PROCdigitize(X,Y,type)
30164 LOCAL XZ,YZ,ixZ,iyZ
30165 cursorx=X: cursory=Y
30166 REM Get co-ord of cursor
30167 XZ=FNpointx(X)
30168 YZ=FNpointy(Y)
30169 ixZ=4:iyZ=4
30170 GCOL 3,127
30171 PROCdrawcursor(XZ,YZ,type)
30172 REM Switch of cursor keys
30173 #FX 4 1
30174 A=GET
30175 IF A=13 THEN 30185
30176 IF A<&88 OR A>&88 THEN 30174
30177 REM Move cursor
30178 PROCdrawcursor(XZ,YZ,type)
30179 IF A=&88 THEN XZ=XZ-ixZ
30180 IF A=&89 THEN XZ=XZ+ixZ
30181 IF A=&8A THEN YZ=YZ-iyZ
30182 IF A=&8B THEN YZ=YZ+iyZ
30183 GOTO 30171
30184 REM reset cursor co-ordinates
30185 cursorx=XZ/scalex
30186 cursory=YZ/scaley
30187 PROCdrawcursor(XZ,YZ,type)
30188 ENDPROC
30189 :
30190 REM ** Draw cursor **
30191 REM For internal use
30192 :
30193 DEF PROCdrawcursor(XZ,YZ,type)
30194 IF type=cross THEN MOVE XZ-20,YZ:
DRAW XZ+20,YZ:MOVE XZ,YZ-20:DRAW XZ,YZ+20
ELSE MOVE FNpointx(minx),YZ:DRAW
FNpointx(maxx),YZ:MOVE XZ,FNpointy(miny)
:DRAW
XZ,FNpointy(maxy)
30195 ENDPROC

```

Graphics Utility
by David Elliot

GAMES CENTRE

THE LARGEST SELECTION
OF GAMES IN THE WORLD

We stock the **BIG NAMES**
in Computers including

ATARI 400/800
SINCLAIR ZX 81
ZX SPECTRUM
VIC-64
DRAGON MICRO
and a wide range of
independent
SOFTWARE

Main Computer Branches: 22 OXFORD STREET, London W.1.
439 OXFORD STREET, London W.1.
52 WESTERN ROAD, BRIGHTON.
Also at: 184 REGENT STREET, London W.1.
254 REGENT STREET, London W.1.



AUTOMATA LTD (P)
55a Debenham Road
Portsmouth PO6 3LN
England

PIMANIA

THE ADVENTURE GAME THAT'S FOR REAL! £6,000 PRIZE!

With you for the first time the Golden Age of PIMANIA...
The adventure game that's for real! £6,000 prize!
This is the first time the Golden Age of PIMANIA...
The adventure game that's for real! £6,000 prize!
This is the first time the Golden Age of PIMANIA...
The adventure game that's for real! £6,000 prize!



CHRISTMAS MICROFEST '82

Micro Fair and Seminar for all users
HARDWARE. SOFTWARE. PERIPHERALS.

ADMISSION
ADULT £2.00
CHILD (under 16) £1.00
(half price with coupon)
Entry free and refreshments for ZX 81, ZX Spectrum, VIC 64, TMS Sharp, Sinclair, Vector, Colec, Commodore, Amstrad, Atari, Plot and Apple.

- 10 Free draw for MICRO computer
- 20 Club Stands
- 30 Bring and Buy stall
- 40 Free parking
- 50 Review of Sinclair Spectrum
- 60 Lecture on small micro applications
- 70 Free Film
- 80 Beer and refreshments
- 90 Discs to centre and Piccadilly station
- 100 Free Coffee
- 110 Facilities for the Disabled



UNIVERSITY OF MANCHESTER INSTITUTE OF SCIENCE AND
TECHNOLOGY SACKVILLE ST. MANCHESTER
SATURDAY 11.10.82 - 21.00
SUNDAY 12.10.82 - 15.00
DECEMBER 1982

KEMPSTON (MICRO) ELECTRONICS



PRICE BREAKTHROUGH!

SPECTRUM JOYSTICK complete with interface
and full instructions for use in basic. £19.50 inc VAT

ZX81 KLIK-KEYBOARD



This is a moving keyboard with
41 real keys that fits in the
recess left after peeling off the
existing 'touch sensitive' mem-
brane keypad.

£26.50
inc VAT

- NEW! ZX81 AUTO REPEAT MODULE £6.50
- ZX SPECTRUM PPI PORT £16.50
- ZX TWO-SLOT MOTHERBOARD £16.95
- ZX STACKABLE CONNECTOR £5.50

This is a most attractive keyboard which will enhance the
appearance and improve the performance of your ZX81. Why
pay more for an oversized keyboard?

PLEASE NOTE OUR NEW ADDRESS
Cheques/Postal orders made payable to:
KEMPSTON (MICRO) ELECTRONICS
180A Bedford Road
Kempston, Bedford
MK42 8BL. Tel: 0234 652997

Please add £1 for postage. Delivery 3 days from receipt
order. SAE in all correspondence please.

Automatic loading

John Ingham presents an index routine to sort through different programs on one tape.

This tape index program is a fully automatic, electronic digital counter for the Vic20. It allows for the selection, automatic loading and running of your other programs.

Enter the index program in your Vic and change the data lines from 340 to 450 to the program names which you wish to save. Then save this program at the beginning of a C60 tape cassette.

To save each of the programs you wish to put on the C60 tape cassette take the following steps:

- 1) Load and run the index program off the C60 tape cassette.

- 2) Select the program you wish to save on the C60 tape cassette — the computer will use the fast forward to find the correct position on the C60 cassette.
- 3) When the computer asks you to "Press play on tape", press the stop key and clear the screen.
- 4) Remove the now set C60 tape cassette from the tape unit.
- 5) Insert your selected program in the unit.
- 6) And fully rewind the tape to its beginning.
- 7) Type the word 'Load' on the screen and press 'Return' key.
- 8) When the program has loaded, remove the tape cassette.
- 9) Insert the previously set C60 in the tape housing right way up.
- 10) Type the words 'Save' your program name then press 'Return' key.
- 11) Your program has now been saved on the C60 cassette.

- 12) To 'Verify' the program take steps 1-9 then type verify and 'return' key.

To load a program using tape index, just follow program instructions.

To compensate for different tape units, measure the fast forward time from beginning to end using a C60 cassette. Then enter it in line 160 — FFT=time in seconds.

Always use good quality cassette tapes. I use Sony CHF60.

Variables description:

FFT=WINDING TIME
PC=REWIND DIVIDED BY PLAY TIME
A=CASSETTE MOTOR ON & OFF
FT=PROGRAM INDEX
TI=VIC CLOCK COUNT UP
B=KEYBOARD BUFFER
D=SCREEN LINE FOR CURSOR
L=STRING OF SPACES
A\$(7)=A-N CODES
A\$(8)=PROGRAM NAMES
BS=8K EXPANDED CHUNKS ON C60
TIS=24 HOUR CLOCK
C=CHARACTER BUFFER

```

100 REM*****
110 REM TAPE INDEX#
120 REM PROGRAM #
130 REM FOR VIC 20#
140 REM BY J. INGHAM#
150 REM*****
160 FFT=98:REM C60 WINDING TIME SEC
170 PC=5.073E-2:REM REWIND/PLAY TIME
180 POKE37148,52:A=37151:B=631:C=198:D=211
190 PRINT"*****":DIM A$(12),B$(12):L$=""
200 FORI=0TO38:L$=L$+CHR$(32):NEXT L$:L$=" "
210 FORI=65TO76:READ B$(I-65):IF LEN(B$(I-65))>16 THEN 230
220 A$(I-65)=CHR$(I):GOTO 270
230 PRINT"*****STRING TOO LONG*****":PRINT"IN DATA LINES"
240 PRINT"COUNT THE CHARACTORS"
250 PRINT"OF DATA LINES 340-450"
260 LIST340-450
270 NEXT:GOSUB 600
280 PRINT"*****SELECT APPROPRIATE CODE FOR"
290 PRINT"POSITION ON TAPE ? ";
300 POKE C,0
310 GETA$:IFA$=""THEN310
320 IFA$("<A>OR<A>")L"THEN300
330 BS=ASC(A$)-64:PRINT A$:B$=B$(ASC(A$)-65):A$="LOAD"
340 DATA PROGRAM 1
350 DATA PROGRAM 2
360 DATA PROGRAM 3
370 DATA PROGRAM 4
380 DATA PROGRAM 5
390 DATA PROGRAM 6
400 DATA PROGRAM 7
410 DATA PROGRAM 8
420 DATA PROGRAM 9
430 DATA PROGRAM 10
440 DATA PROGRAM 11
450 DATA PROGRAM 12
460 PRINT"*****YOU ARE GOING TO "A$;" "":B$
470 PRINT"*****IS IT CORRECT ? ";
480 POKE C,0
    
```

```

490 GETD$:IFD$=""THEN490
500 IFD$="N"THEN RUN
510 IFD$("<Y>")THEN480
520 GOSUB750
530 PRINT"*****PRESS REW ON TAPE"
540 IFPEEK(37151)<>6200TO540
550 FORI=1TO600:NEXT
560 PRINT"*****PRESS STOP ON TAPE"
570 PRINT"*****WHEN FULLY REWOUND."
580 IFPEEK(37151)<>12600TO580
590 GOSUB750:PRINT"*****":GOSUB600:GOSUB620:GOSUB660
600 FORI=0TO11:PRINT"*****":A$(I)=" "":B$(I):NEXT
610 RETURN
620 TIS="000000":BS=BS#0000
630 FT=.1159E1+.13985E-2#BS-.71234E-8#BS#2+.24548E-13#BS#3-3.5562
640 FT=FT#FFT/98#19.7134#PC
650 RETURN
660 PRINT"*****PRESS F,FWD ON TAPE"
670 IFPEEK(37151)<>6200TO670
680 PRINTL$
690 PRINT"*****FAST WINDING TO "B$
700 TIS="000000":FT=TI+FT#60
710 PRINT"*****INT(TI/10);INT(FT/10)
720 IF(CFTGOTO710
730 POKE A,52:POKE37148,6
740 GOSUB750:GOTO790
750 PRINT"*****PRESS STOP ON TAPE"
760 IFPEEK(A)<>12600TO760
770 POKEA-3,12
780 RETURN
790 PRINT"*****":POKE D,11:PRINT:PRINT"*****"
800 PRINT"*****":A$:
810 PRINT,CHR$(34):B$:CHR$(34):"*****"
820 POKE B,12:POKE C,5:POKE B+1,13:POKEB+2,13:POKEB+3,13:POKEB+4,13
    
```

READY.

Stringing up for time

In part four of our extract from *The Working Spectrum* we continue adding modules/sub-routines to the *Unifile* program, designed to enable a single program to cover a variety of filing tasks without the need for constant re-writing every time a new use comes along.

MODULE 5

This module is the most complex in the program. Before proceeding to a detailed commentary we shall discuss two issues:

1. The use of strings to store numbers.
2. The technique of the binary search.

Numbers in Strings

We have already seen, in Module 3, that the pointers for our program are stored in a string, *Y\$*. You may be wondering why numeric values are not being stored in a straightforward numeric array. The answer stems from both memory saving and time saving, the latter being the more significant. Let's look at memory saving first.

To cope with the maximum number of entries that are likely to be encountered, a numeric array for the pointers would have to be declared with something like 2,000 elements. It is most unlikely that you will actually have 2,000 entries, but you might. You would have serious problems if your array turned out to have too few spaces for the number of entries that have to be pointed to. An array cannot be re-dimensioned without losing everything in it. The real problem is that a 2,000 element numeric array, because of the way in which Sinclair Basic stores numbers, would occupy some 10,000 bytes of memory. This is an extravagant proportion of the total memory available.

The Spectrum allocates five bytes of memory to every number stored in an array, in an effort to cover as wide a range of numbers as possible — up to 4,294,967,295 in fact. We do not need anything like that range: our file is only 28,000 characters long so we only need whole numbers from 1 to 28,000. Using two character strings it is possible to represent these numbers.

Each character has a code value unique to it, in the range 0 to 255. A single character can be used to store any value between 0 and 255 simply by using the character that has that code. Thus the character *A* represents the number 65 and the keyword *GOTO* — just another character as far as the Spectrum is concerned — represents the number 236. Numbers larger than 255 are simply represented by using a second character to store the number of whole 256s, in much the same way that the 3 in 36 means three whole tens in our decimal system. Two characters, therefore, give us the ability to store any positive whole number up to $255 \times 256 + 255$. That equals 65,535 and is more

than enough to copy with our file of 28,000 characters.

Provided you only want positive whole numbers in the range 0 to 65,535 it is possible to save three of the five bytes that the Spectrum would use if the same numbers were stored in a numeric array.

The catch is that two of the three bytes saved are then thrown away in the search for speed.

Imagine again our numeric array of 2,000 elements and imagine you want to add or delete a number somewhere near the beginning of it. If you simply delete an unwanted value you leave a hole, or rather a zero, in the place where the number once was. If you insert a number you will overwrite what is already there. To avoid either of these unwanted results you have to ensure that every element in the array can be shifted up or down one place. If the position in which you want to insert a new number is position 1, then 1,999 numbers are going to have to be shifted to make room. It can be done with three lines of Basic in the form of a simple loop but it does take time, especially on a Spectrum. Not even its best friends describe the Spectrum as blindingly fast.

Now compare that loop, repeating its operation 1,999 times with this:

```
LET A$ = "XX" + A$
```

Using the Spectrum's superb string handling we can simply insert two bytes at the beginning, or at the end, or in the middle, of a string with one instruction. This is very fast but it has a drawback — it momentarily doubles the amount of space taken by the string. The Spectrum needs to hold in its memory, even if only for a moment, the new *A\$* that the line is creating, together with the old *A\$* that is being used to build it. This limitation is one of the biggest drawbacks to the Spectrum's string handling and it is difficult to avoid. It means that *Y\$*, which is used to store the pairs of characters which we use as pointers to the entries in the main file, is effectively twice as long as it looks since, in our search for speed, it will momentarily double every time we add to it or delete from it. The doubling may only be momentary, but we must still allow memory space for it. It's a shame, but we have to learn to live with it.

This drawback is the reason we do not use the same method for actually inserting

or deleting data in our main file *B\$*. To do so would halve the amount of space that could be used for entries. We have set up *B\$* as a fixed length array and, when we want to delete something, we move the rest of the file down chunk by chunk to fill the gap created.

Binary Searching

We will use the binary search technique to reduce the possible number of comparisons made when finding the correct place to insert a new entry from a possible 12,500 to 15. Consider the following example.

We have established a file which now contains 2,000 items and the current input needs to be inserted at position 1731, although the program has not yet discovered this. The program begins its search by looking at the first entry and comparing it with the new entry to be inserted. The new entry is found to be the greater of the two and so the program moves on to compare it with entry number 2. Eventually after making 1,731 comparisons the program comes across the first entry in the file which is greater than the new entry. It has now found the correct position for the item.

Compare this straightforward procedure with the following for a file of the same size and an insertion in the same position.

The program begins by examining the entry in position 1024, that being the great power of 2 which is less than or equal to the number of entries in the file. The entry at that position is found to be less than the new entry. The program adds 1024/2 to 1024 giving the result 1536. The entry at 1536 is still less than the new entry so 1024/4 is added to 1536, giving 1792. The entry at 1792 is greater than the new entry so 1024/8 is subtracted from 1792 giving 1664. The search proceeds at the following locations in the file with the following additions or subtractions.

```
1644 (then add 64)
1728 (then add 32)
1760 (then subtract 16)
1744 (then subtract 8)
1736 (then subtract 4)
1732 (then subtract 2)
1730 (then add 1)
Final result, 1731
```

The power of a binary search should be apparent.

Commentary on Module 5 continues next week.

UNIFILE: Module 5

```
1050 REM *****
1055 REM PLACE DATA IN FILE
1060 REM *****
1065 IF P=LEN R$-1 THEN GOTO 1730
1070 PRINT AT 14,10;"FILE NOW FULL"
1075 GOTO 1730
1080 PRINT "Press any key to continue"
1085 PAUSE 5
1090 RETURN
1100 LET POWER=INT (LN (N-1)/LN 2)
1110 LET T$=R$(2 TO CODE R$(1))
1120 FOR K=POWER-1 TO 0 STEP -1
```

```
1170 LET C=FN R(1)
1180 LET U$=FN R$(1 TO 2 TO 1)
1190 LET S$=(R$(K)+1)*U$-(R$(K)+1)
1200 LET S$=S$+1
1210 IF S$>N-1 THEN LET S$=N-1
1220 IF S$>N-1 THEN LET S$=N-1
1230 NEXT K
1240 LET C=FN R(1)
1250 LET U$=FN R$(1 TO 2 TO 1)
1260 IF T$<U$ THEN LET S$=S$-1
1270 LET S$=S$+1
1280 LET S$=S$+1
1290 LET Y$=(1 TO 2 TO 1)+C$R$ IN T$(P/256)+C$R$ (P/256)+INT (P/256)
1300 LET P=P+LEN R$
1310 RETURN
```




RAG on the Dragon

Dave Windle teaches his Dragon to produce random art generation.

Having got your computer, what do you use it for? How many times has that question been asked? There are always games of course. Or lists of phone numbers of friends whose numbers you know quite well — and even if you do not, it's far quicker to get out the family directory, which you probably used to compile the program in the first place. So, what do you use a micro for?

One possibility is RAG (Random Art Generation). Most of the available micros can cope quite easily with this type of program. The following programs are for the Dragon, but with minimal alterations will run on most types of micro.

Colour computers can, in the main, draw pictures using their various graphics capabilities. However, these can be tedious and time consuming. The answer? Random Generation. Simple programs producing perpetual displays. These displays can be a great talking point at parties and are as easily as therapeutic as gazing into an aquarium, and a lot more colourful.

Our first program consists of circles of various sizes drawn one over the other ad infinitum. As some of these are painted and others just outlined, the effects can be quite stunning.

In this program, line 20 sets mode and colour set. Lines 30 to 60 set random numbers X and Y for co-ordinates R for radius and C for colour. Line 70 draws circle outline and line 80 paints circle (as some of the circles overlap others of the same colour, these usually will not be painted). Line 90 slows things down and line 100 sets the loop.

The same idea is used in the second program. Only this time we use squares and rectangles.

In this program red is the dominant colour and would eventually fill the screen. Therefore line 120 is necessary to clear the screen and send us back to the drawing board.

The next example is, more or less, a combination of the previous two. One of the advantages of this type of program is that they are readily altered. Thus allowing each 'Electro artist' to develop his or her own style.

It is sensible to build a stop device into the programs. Just in case you get a masterpiece on the screen. Then its out with the brushes. After all, even Constable only painted what he saw. Try this:

```
line no AS = INKEYS: IF AS = "S" THEN n ELSE nn
line no GOTO n
```

(n = number of following line nn = last line of program)

These two lines should be inserted

between the penultimate and last line of your program.

The previous three programs have had,

(like the fish tank) a soothing, therapeutic effect. For an alternative, more mind blowing, result try program four.

PROGRAM 1 CIRCLE ART

```
10 REM CIRCLE ART DAVE WINDLE 1982
20 PMODE 3,1:SCREEN 1,0:PCLS
30 X=(RND(255))
40 Y=(RND(191))
50 R=(RND(90))
60 C=(RND(8))
70 CIRCLE(X,Y),R,C
80 PAINT (X,Y),C,C
90 FOR L=1 TO 500:NEXT L
100 GOTO30
```

PROGRAM 2 SQUARE ART

```
10 REM SQUARE ART DAVE WINDLE 1982
20 PMODE 3,1:SCREEN 1,0:PCLS:S=0
30 A=(RND(255))
40 B=(RND(191))
50 C=(RND(8))
60 D=(RND(220))
70 E=(RND(180))
80 X=D+5:Y=E+5
90 LINE(A,B)-(D,E),PSET,B
100 PAINT(X,Y),C,4
110 FOR L=1 TO 500:NEXT L
120 S=S+1:IF S=25 THEN 10
130 GOTO 30
```

PROGRAM 3 COMBO ART

```
10 REM COMBO ART DAVE WINDLE 1982
20 PMODE 3,1:SCREEN 1,1:PCLS
30 X=(RND(255))
40 A=(RND(255))
50 Y=(RND(191))
60 B=(RND(191))
70 R=(RND(90))
80 D=(RND(120))
90 C=(RND(8))
100 E=(RND(180))
110 CIRCLE(X,Y),R,C
120 LINE(A,B)-(D,E),PSET,B
130 PAINT(X,Y),C,4
140 FOR L=1 TO 500:NEXT L
150 GOTO30
```

PROGRAM 4 FLASH

```
10 REM FLASH DAVE WINDLE 1982
20 PCLS
30 X=(RND(3))
40 PMODE X,1:SCREEN 1,1
50 A=128: B=92
60 C=(RND(250)): D=(RND(172))
70 LINE(A,B)-(C,D),PSET
80 SOUND C,1
90 GOTO 30
```

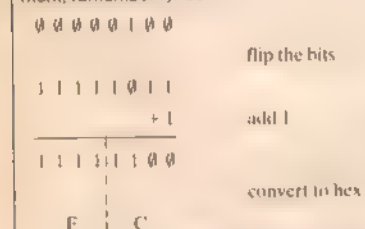
Executing instructions

Two weeks ago we looked at flags and how they affect conditional jumps. We also examined relative jumps and how they can be used to move 128 bytes backwards or 127 bytes forwards.

Suppose the code is to be loaded from 4300 hex:

Address	Instruction	Hex code
4300	LD A, 1E	3E 1E
4302	LOOP: CP A, (HL)	BE
4303	INC HL	23
4304	JRNZ LOOP	20 FC

Why is *Fc* in the address part of the *Jrnz* instruction? It works like this: when the *Jrnz* instruction is executed the *Pc* is bumped up by 2 because it's a 2-byte instruction. So the *Pc* is now at 4306. We want to jump to *Loop*, which is at 4302, 4 bytes back, or -4 bytes away, to use the Z80's way of thinking about it. Now, 4 in binary is 00000100 and we create -4 by flipping the bits and adding 1 (2's complement, remember?). So:



Another thing which may be worrying you: *Inc Hl* does not alter the flags, so it is safe to test after the increment.

The same program with absolute jumps would have looked like:

Address	Instruction	Hex code
4300	LD A, 1E	3E 1E
4302	LOOP: CP A, (HL)	BE
4303	INC HL	23
4304	JPNZ LOOP	C202 43

Notice that the *Jpnz* instruction has 3 bytes because it contains a whole 16-bit address — and do not forget about swapping the 2 bytes in that address around!

There is one very powerful instruction in the jump group we have not mentioned yet — *Djnz*. It decrements the *B*-register by 1 and jumps (relative) only if the result is non-zero. Suppose our little "search for 1E" program is only to search a region one hundred (hex 64) bytes long, after which it should leave the loop whether it's found a 1E or not:

LD B, 64	06 40
LD A, 1E	3E 1E

LOOP:	CP A, (HL)	BE
	JNZ GOTCHA	CA (address for GOTCHA)
	INC HL	23
	DJNZ LOOP	10 F9

The loop is executed 100 times, unless a 1E is found, in which case a branch to *Gotcha* occurs. In other words, *Djnz* acts like a simple *For* loop in Basic.

Note that with all the relative jump commands *Jr*, *Jrc*, *Jmc*, *Jmz*, and *Jrz*, the size of jump is calculated the same way.

Adc and Sbc

These are the "Add with Carry" and "Sub with Carry" instructions. We said earlier that there is a Carry flag in the flags register. This gets set if there is a carry generated out of a register by an arithmetic instruction. The *Adc* instruction will act just like *Add*, except that it will add 1 more in if the Carry bit has been set by a previous operation. The *Sbc* instruction works the same way, except that it will subtract the carry flag.

The shift instructions, *Sla*, *Sra* and *Srl*, all have the effect of shifting bit-patterns around. *Sla* shifts the pattern left by 1 bit, so if the *B* register contains:

0 0 1 0 1 1 0 0

and *Slab* is executed, the result is:

0 1 0 1 1 0 0 0

(Notice that a zero is used to fill on the right.)

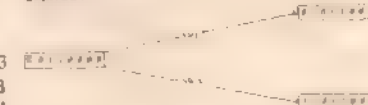
Since 00101100 = 44 and 01011000 = 88 (decimal) you can see that the effect is to multiply by 2.

Another *Slab* will give:

1 0 1 1 0 0 0 0

Since the senior bit is now one, this will be seen as a negative number and the sign flag will be set. So far as the programmer is concerned, what's happened is that the value (176) cannot be held in a byte — so you have got an overflow condition.

Right shifts work much the same way, but there is one important thing to note: *Srl* fills the senior bit with a zero, but *Sra* fills with whatever was there before. For instance:



The reason is this: *Srl* is a shift right logical, which simply shifts the bit pattern without altering it. *Sra* is a shift right arithmetic, which treats the operation as "divide by 2". Now, when a negative number is divided by 2 the result should still be negative, so you have to preserve the sign bit.

Push and Pop

You will probably remember these terms from our discussion on stacks. They are used here in exactly the same way, and

allow you to access the machine stack other than through a subroutine call.

This can be useful for saving values temporarily. For instance, suppose you've got a value in *BC* which you want later, but just now you'd like to use *BC* for something else. You can write:

PUSH BC	
Code using BC	
POP BC	

This is often done before a subroutine *Call* as well, so that it does not matter what registers the subroutine uses it cannot interfere with the calling program's data. You may see code like:

PUSH BC	save the registers
PUSH DE	
PUSH HL	
CALL 4FA1	
POP HL	restore register values
POP DE	(note the order!)
POP BC	

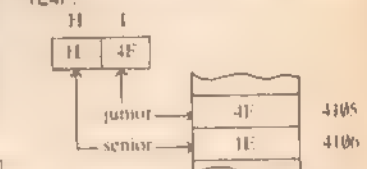
assuming that the *A*-register is manipulated by the routine, so you do not need to save it.

Unless you deliberately choose to alter it, the stack pointer *Sp* will be set according to the operating system of the ZX81. There's no harm in leaving it at that value, provided you make sure that *Pushes* and *Pops* cancel out in pairs, so that *Sp* returns to its initial value on leaving the machine code routine. Similarly *Calls* and *Ret*s have to match (*Usr* generates a *Call*, matched by the final *Ret* that is tacked on to the end by the *Loader* routine).

One feature of the 16-bit operations (*Push*, *Pop*, *Ld* in particular) which is important to grasp is the order in which bytes are transferred from register to memory and vice versa. It's like this:

LD (4105), HL

will have the following effect, if *Hl* contains 1E4F:



In other words, the least significant or "junior" byte in the register is loaded into the specified address, and the most significant or "senior" byte is loaded into the byte following this.

If you have any machine code sub-routines/tips/games, please send them to: Machine Code, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Reproduced from Machine Code and better Basic, by Ian Stewart and Robin Jones (price £7.50), by kind permission of Shiva Publishing Ltd, 4 Church Lane, Nantwich, Cheshire CW5 5RQ.

PEEK & POKE

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem **Peek it to Ian Beardsmore** and every week he will **Poke** back as many answers as he can. The address is **Peek & Poke, PCW, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.**

POISED FOR ACTION ON SEIKOSHA

Stephen Yu of Kettering, Northants, writes:

Q I have just purchased a Seikosha GP 100 printer for my BBC model B micro-computer. But I have the following problem. How do I get the (£) symbol onto my printer? However hard I try all I can get is the (') symbol.

A The problem is one of coding. The £ symbol is more or less unique to this country, and therefore does not have a place in the ascii standard. Instead, it is put in at one of the code numbers not allocated by the ascii standard. On the BBC (and the Spectrum, and the Ace incidentally) it has been put in at number 96.

However, on the Seikosha the £ sign has been put in at number 185. Therefore, every time you want to use the £ sign you should call the character at Code 185, when the computer is calling the character at 96. The only way round this is to write a procedure that will read all the input to check for a Code 96 entry, and to replace it on the printer with a 185. The following routine can be quite tedious, but it will do the job:

```
DEF PROC conv
PRINT AS
FOR P=1 TO LEN AS
VDU 1
IF MID$(AS,P,1)="£" THEN PRINT CHR$(185) ELSE PRINT MID$(AS,P,1)
NEXT P
END PROC
```

PLANNING FOR CONVERSION

Paul Ferris of Coopers Cray Hill, London, writes:

Q I have a Vic20 and am very pleased with it. But now, after nearly a year, I think I want to go on to a better computer. The one I am interested in is the new Commodore 64. But, the problem is that I have a lot of software for my

Vic20. I would like to know if I can use it on a Commodore 64 if I bought one.

A In short, the answer is no. However, a reader from Birmingham, Mr McCann, has sent us a letter he recently received from Commodore telling him that there are plans to make a conversion available to up-date the Vic20 to a Commodore 64. The letter from Commodore is labelled 'Preliminary Information Subject to Change'. However, it is hoped that more details will be available before Christmas.

ABANDONING BASIC FOR FORTH

Mr A Cranston of Upton Road, Slough, writes:

Q I have an interest in the new Jupiter Ace, and I think it is set to cause much excitement. I would like to know more about its language Forth. I was hoping that you could refer me to some books that would introduce me to Forth.

A Also, is it true that the Ace will be compatible with the Sinclair 16K Ram pack?

A I think you are right about the amount of interest the Ace has engendered, though it still remains to be seen just how many people will take the plunge and abandon Basic. I feel it would be safest to recommend two of the books that are mentioned in the provisional instructions to the Ace, namely, 'Discover Forth' by Tom Hogan (published by Osborne/McGraw-Hill) and 'Introduction to Forth' by Ken Kencht (published by Howard W Sams).

The book that is placed as the best choice to look at is 'Starting Forth' by Leo Brodie (published by Prentice Hall). Unfortunately, I have not been able to track down a copy at the time of writing, so I cannot say what it is like.

I think a lot of people heard

the rumour that the ZX81 Ram pack was going to be compatible with the Ace, and maybe other ZX peripherals as well. However, the ZX81 Ram pack will have to be modified before it can be used with the Ace.

WRITING FOR JOYSTICK USE

Susan Wallis of Garth Road, Morden, writes:

Q A friend of mine is selling his Atari video games machine to buy a computer. He says that his Atari joysticks will work on my Vic. I tried them and they did. I would like to know if it is OK to use them, or will they damage my computer? Also, how do you write programs that use the joystick for moving something on the screen?

A The Atari and Vic joysticks are the same, apart from the packaging. You should have no problems using them on your Vic. As for incorporating them into your programs, we did an article on that subject in our October 14 issue.

MACHINE-CODE ON NON-STANDARD CHIP

Mr A Doodes of Hainault Road, Leytonstone, London E11, writes:

Q I have recently bought a Sharp PC-1500. While I find the machine interesting and fun, I must admit that I find the manual pretty abysmal. However, while playing around I have discovered that the computer does in fact have Peek, Poke and Call, functions built into the Basic. In other words, it is possible to write user machine code programs on it.

However, I do not know what the CPU is. The manual merely refers to a CMOS 8-bit chip. Some reading around and a few experiments convinces me that it is not a 6502, but what is it? Do you know where I can get hold of a suitable book to learn the machine code?

A I am afraid that you are going to have to wait. The chip is an 'in house' design that is not used anywhere else. It is, as you rightly say, built around a CMOS 8-bit chip, but that is almost all that is

known at the moment. Or rather that is all the information that has been released in this country to date.

The parent company in Japan still has the copyright on the chip and its mnemonics. It is unlikely that they will publish details yet. I was told that ■ a rough guess it will be about 4-6 months before the details are available over here.

The details have already been published in Japan, in Japanese! A book on the subject is available over there and is awaiting translation now.

I must be honest and say that machine code is enough for me to get to grips with. The thought of having to master it on a non-standard chip, in Japanese, is a prospect that I personally do not relish. So I can only advise you to wait, and keep an eye on the computer press for further developments. All you can do until then is Poke around inside the memory and see if you can learn anything that way.

SEND IT BACK TO SINCLAIR

Rupert Atkinson of Gaverston Road, Leamington Spa, Warwickshire, writes:

Q I have recently obtained my Spectrum and I have a problem with it. After about half an hour the display freezes and everything stops. No amount of key pressing will bring it back to normality. I have to remove the power supply and reset the computer. But this is happening with increasing regularity.

Should I send it back ■ Sinclair, or is there any way to solve this problem?

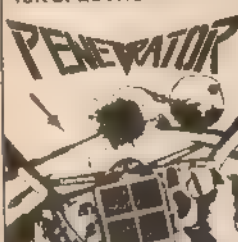
A This sounds very like the initial design flaw that halted the Spectrum when it was first launched. The flaw was a clash between the ULA and the Z80s, where they both try and use the same data bus at the same time. Perhaps you have an old machine that slipped through the net, or one in which the modification to rectify this error (a Nand gate added) has not been done properly.

However much you dread the thought, I can only suggest that you send your computer back to be repaired under the guarantee.

CLASSIFIED

Semi-display — £5 per single cc
Trade lineage — 20p per word
Private lineage — 10p per word

Melbourne House software for the 48K SPECTRUM



"Amazingly Fast Arcade Action!
Includes 'Training Mode' and
'Unique Customizing Feature'
The fastest and most exciting
game for your 48K Spectrum

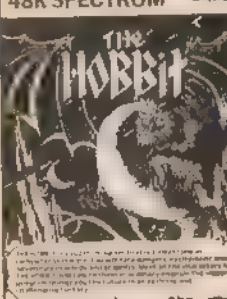
**PENETRATOR for the 48K
Spectrum is only £6.95.**
Orders to Melbourne House,
131 Trafalgar Road,
London SE10.

DRAGON 32 PROGRAMS

Cassette One — Utility programs including
Index, Valuable, Photograph, Making
Cross, Resistance, Pools, Tides, Hares, Cross
hatch, More, Swap, Earth, Defence.
Cassette Two — Games programs including
collar and sound with moving graphics
Bounce, Catch, Bobbles, Chase, Lunge,
Bitch, Defence. £4.95 each or both for £9.90
including p.p.

**VIDEO PRODUCTIONS, DEPT POC 3
11 FLORDAN ROAD
NEWTON PLUTMAN, NORWICH**

Melbourne House software for the 48K SPECTRUM



**The HOBBIT for the 48K
Spectrum with 112 page full
colour booklet and Hobbit book
now available only £14.95.**
Orders to Melbourne House,
131 Trafalgar Road,
London SE10.

**WANT A JOB
IN MICRO-COMPUTERS?**
We need a micro enthusiast to
assist in our tape programme
duplicating plant. Lots of front-
end responsibility with custom-
ers etc and good pay.

Please contact Nigel Boyle
BIBI MAGNETICS LTD
101/105 PLOUGH ROAD
LONDON SW11 2DJ
Tel: 01-223 5955

ZX SPECTRUM

Vaults of the Vampire Supa Maze

Two great games, testing the
memory and logical abilities of
the player. Both use full sound
and graphic facilities and are
available together for 16K or
48K at £5.95 including VAT
from

**IQ SERVICES
Canal House
Ardishaig, Argyll**

FREE SOFTWARE FOR UNEXPANDED VIC20

Every week I analyse and update in zeph-
net order a list of it is hoped. To follow him is
the basis of my weekly list. However this is
not a list of tips and haphazard use can only
end in disaster but used alongside your Daily
Spectrum Newspapers could prove to be
invaluable this leaves each individual plenty
of scope to exercise his own judgement, or
system that and rational thought. I will be
charging £1 per issue to cover cost of
postage stamps and print etc. Posted to
arrive Fridays. Order 15 or more weekly its
and get a free cassette of Horsinground
software. Mr S Orchard, 122 Newstone
Road, Ipswich, Suffolk IP3 8EP.

SPECTRUM OWNERS

All the software you'll ever need. The
best Spectrum programmes for a once-
only payment of £10 plus a hire fee of
£1.25 per tape.

JOIN TODAY Send £10 for 10 tape mem-
bership and first new tape for

SPECTRAL SOFTWARE LIBRARY
13 Charlotte Road, Poynton
Stockport, Cheshire SK12 1DJ
or send SAE for details

Horsinground was never like this! LYNCHBOM for the ZX81 (16K) and ZX Spectrum (16K)

A competitive game of skill and strategy for 2
to 6 players. It's much things but the program
picks turns. If you're the lucky one, you type
in a word or phrase. Then it's the other
players turn to show their word skill. But
look out if they guess wrong for then the
lynching begins!

Great fun! And don't forget to tell Albus and
Dad it's education too! Ideal for the family
Christmas get-together! Buy the TV
Superb animated graphics — The Spec-
trum version has brilliant multi-colour and
sound effects!

LYNCHBOM for the ZX81 (16K RAM) ... £2.95
LYNCHBOM for the ZX Spectrum (16K-48K) ... £3.50

All inclusive price. Sent 1st class by return
full money-back guarantee

Dept Pop, BRIDGE SOFTWARE
36 Farnwood, Merple Bridge
STOCKPORT, Cheshire SK8 5BE

SPECTRUM AND ZX81

Accountant, budget, your household expendi-
ture. Cassette. 16K ZX81, £3.95; Spectrum
£4.95. Both versions save and load sepa-
rate datafiles.

ZX81 Datafile: Detailed equipment of
Data and Print using statements. Cassette
£3.95.

SAE for further details. Cheque P.O. to
A. H. Wilson, The Village, Whitworth
Square, Rochdale, Lancs. OL12 6PY.

A new RETAILER for Sinclair accessories
in the North of England. We are
situated near the M1 and M62 motor-
ways. As well as a complete range of
hard and software, our service depart-
ment can repair, modify or fit a wide
range of accessories. Hours of business
10 am — 8 pm, Monday to Saturday
inclusive.

TELEPHONE PHILIP CORLEY ON
0124 272545
**PLEASE RING FOR DETAILS OF OUR
MAIL ORDER SERVICE**

DRAGON GAMES

Five super games for your DRAGON sup-
ply on ONE top quality cassette. AVALAR
BURGLERS BREAKOUT, KIDNAPER
OTHELLO. Fascinating entertainment at
unbelievable low cost. £5.75 per cassette
(incl P&P etc.) J. Montague (Milton), 2
Glenfield Street, Leeds LS9 9JJ.

INVADERS for the VIC20

"A real version of the popular favourite —
machine code, good colour and sound. Four
rows of nine invaders each, five levels. All
difficulty." (VIC Computing, October 1982)

BRIDGEWARE for the BBC micro (model B) ... £7.00
The popular gobble game — full sound and
colour.

Still available (see our last two adverts)
4K INVADERS for the ZX81 (16K) ... £4.00
4K INVADERS for the ZX81 (16K) ... £4.00

SUPER INVADERS for the ZX81 (16K) ... £4.95
LYNCHBOM for the ZX81 (16K) ... £2.95
LYNCHBOM for the ZX Spectrum (16K) ... £3.50

All-inclusive prices. Sent First-Class by return
Full money-back guarantee

Dept. Pop, BRIDGE SOFTWARE
36 Farnwood, Merple Bridge
STOCKPORT, Cheshire, SK8 5BE

BBC MICRO SOFTWARE ARCADE STYLE GAMES (ZXK)

Gobbler Classic Maze Chase. User keyboard
or joystick. £5.45.

City Defense Protect your cities, requires
joystick. £4.95.

Both including full instructions.
Bridge Software

M G B SOFTWARE SUPPLY LTD
32 BAILEY CROFT
HARLOW, ESSEX

DRAGON 32 SOFTWARE

FAMILY PROGRAMS: Eight full-length
original games, utility and educational
programs.

PUZZ AND GAMES: Ten exciting games
for young and old. Ideal for Christmas
presents. £15 for each cassette, 80 for
the set.

Send cheque/PO to Searle Software,
10 Park Vale Court, Vine Way, Brent-
wood, Essex CM14 4UR.

MORSE TUTOR BBC III. For the beginner or lost for practice. Teaches you the code. Tests with random letters. Generates and sends grammatical random messages. Becomes a Morse key. Professionally recorded tape. £4.95 including p & p. Carlton Computing, Carlton College, Little Glemham, Wood- bridge, Suffolk.

New book for Spectrum The Working Spectrum

**THE WORKING
SPECTRUM**
A LIBRARY OF PRACTICAL
SUBROUTINES AND PROGRAMS



DAVID LAWRENCE

Published in association with
Popular Computing Weekly
Send cheque/postal orders, for
£5.95, to The Working Spectrum,
Sunshine Books, Hobhouse
Court, 18 Whitcomb Street, London
WC2 7HF.
We can normally deliver in four to
five days.

WHAT IS AXON USERS GROUP?

Axon Group has been formed to give
school, private clubs and private house
users of Microcomputers a complete
range of consumables at a discounted
price. We are a group of companies
already supplying large trade and
business users because of our
buying power we can pass on the bulk
costs to yourselves. Our aim is to
reduce your cost of consumables at
least 10 per cent. Axon User Group, 31
Cervice Street, London N5 1JT. For
further details please telephone
01-226 8609.

3.5K VIC20 SOFTWARE

PLANETFALL: Lunar lander with a difference.
Escort your fuel to a safe planet landing
under alien attack. Use joystick or keyboard.
Only £9.95

SPACEKILL: 2000 AD and aliens are laying
waste the City of London. Defend your capital
and destroy their membership for a £10 bonus.
Totally addictive. Use joystick or keyboard.
Only £4.95

GAMES PACK 1: Unbelievable value for
money. Consists of Turtle Race, Volleyball,
Pentathlon, Catch 22, Onslaught. Only £4.95

CHRISTMAS PACK: All three cassettes for
£12

All Prices include VAT postage etc.

**SHADOW SOFTWARE, 1 HALLBATE,
THURNECK, NOTTINGHAM,
3, YORKSHIRE YO5 6TU**

Get a DRAGON III or TANDY colour com-
puter. Then you need your own monthly
magazine. HAINBOW for colour computer
users. Send £1.50 and large set for sample
issue. ELKAN ELECTRONICS (Dept. POP),
FREEPOST, 28 Bury New Road, Presbuck,
Manchester M25 8LZ. Telephone 061-796
7815 (24-hour service)

SPECTRUM SOFTWARE SOUND FX: Now
using their amazing machine code routines,
you can add PROPER sound effects to YOUR
programs. Lasers, explosions, animal noises.
No M.B. knowledge required. Full instructions.
4 STARTRAX II: New most incredible 48K
spectrum game around. Exciting space com-
bat simulation. Standard features plus much
more in this FULL 48K experience. Proper
sound effects using M.C. routines give this
game a new dimension. Free manual. £6
cassette. SAE for details on our full range for
the Spectrum. Cheques, P.O.s to SORAC
SOFTWARE, 9 Bendcliffe Drive, Lough-
borough, Leics.

VIC20 Programmers required

System Company looking for competent
programmers to basic or machine code to
write games and business programs for the
VIC20. enormous earning potential for the
right people. Send details or sample pro-
grams to
**Software Department, 42 Danes Hill Road
Ebbw, Here**

HIRE ZX cassettes FOR JUST £1 EACH!

Get the most from your ZX81 or Spectrum by
hiring programme cassettes for just £1 each
(plus 25p p.p.) per fortnight!

We offer a terrific selection of over 150 tapes
— all the latest adventures, games including
3-D adventures, tests, all skill and wits, plus
utility and lookfor the expert.

Just send £3 annual membership and we
will send you a Library List. Newsletter and
order forms by return — on full money-back
approval!

Single Owners: SOFTWARE LIBRARY
Hawthorn Cottage, Warren Road,
LUSS, Hants GU33 7DD

INVADERS for the VIC20
A real version of the popular favourite machine code, good colour and sound. Four tapes of nine invaders each. Two levels of difficulty. VIC Computing, October 1982.

BRIDGEMAN for the BBC micro (model B)

The popular gobblet game - full sound and colour.

Still available (see our last two adverts)

4K INVADERS for the ZX81 (at least 4K Ram)

SHARP INVADERS for the ZX81 (16K)

LYNCHING for the ZX81 (16K)

LYNCHING for the ZX Spectrum (16K)

All inclusive prices. Sent First Class by return.

Dept. Pop. **BRIDGE SOFTWARE**

36 Fernwood, Maple Bridge

STOCKPORT, Cheshire, SK5 5BE

ATARI VIDEO COMPUTER complete with Combat and Space Invaders cartridges, joysticks, paddles and power supply, as new, £85.00. Tel. Portsmouth (0705) 695627

MULTITECH MIFI MICRO PROCESSOR Experimental list £80. boxed, complete with manual. £35.00. Tel. 024026 3079 (South Bucks).

ZX81, 16K, with integrated circuit board and cassettes. £80.00. Tel. 01-337 5463.

8K UK101, Cased, leads and manual plus software, including Space Invaders, Pacman, £90.00 ono. Tel. Scunthorpe 848398.

COMMODORE PET 3015. Also cassette deck and counter, micro assembler, super chips, too (kit, discoverer. Pet revealed, manuals, much software. Sell for £257.00 ono. Tel. Blackpool (0253) 688930.

16K ZX81. Two great new games on one cassette. Dog Race and Oil Refinery. £2.75 Martin Mellors 2 Rockleys View, Lowdham Grange, Lowdham, Nottingham

SPECTRUM

SHEEPDOG TALK 14K. Ten up to 20 very obstinate sheep. Good graphics. £2.95 including P&P.

GOLF 16K. 18-hole course. Holes not randomly generated. Bag of clubs. 0.24 handicap. Includes course design notes.

£3.45 including P&P.

Gib Software, 1 Raineside, Crayke Inn, Pocklington, Wilt Gloucestershire

VIC20 USERS: Software, good quality, no fancy packaging, hints-tips, listing service, 50% royalties and more. Send s.a.e. C. P. White (Services), 76 Usbridge Road, Hanwell, London W73SU

SHARP MZ80A with 5 applications cassettes plus Basic and Assembly package. Additional instruction books. £390. Tel. Cheltenham 21491 ext 2903 during office hours.

MZ-80A/K cassettes, games, business, utility, education most at £3. Also Basic-plus £12. List - s.a.e. 38 South Parade, Bramhall, Stockport

ZX81 + Memo + Gulp and Defender (3D). Still under guarantee all yours for just £60.00. Tel. HX 70668

VIC20 SOFTWARE from 99p. Send s.a.e. D. Spencer, 230 Lowgrave Avenue, Billingham.

BBC MICRO Slot-in printed cards enable you to label the user definable keys. Spaces also provided for program name keys 10-15 etc. £1.80-10, £2.40-20, £4.60-50. H. Banton, 8 Princess Road, Urmston, Manchester M43 3SS

KEYBOARD DECODER, cased, quality 76 keys plus two keyboards. Tel. Horsham 69835

WANTED: PERSONAL COMPUTERS. All models bought for cash. Morgan Camera Co. 160 Tottenham Court Road, London W1

SPECTRUM RENUMBER. Instantly renumbers all or part of program. All Gotos, Gosubs, etc. included. The first and probably the best in machine code for only £9.95. David Webb, Southolme, 9 Park Road, Woking, Surrey

TWENTY 1K ZX81 GAMES. Cassette and documentation £5. SAE S. Kelly (CW), 7 Atterton House, Harewood Road, South Croydon, Surrey. CR2 7AL

DRAGON CASSETTE GAME. Stockmarket only £2.00. From Nigel Bradder, 72 Berry Hill Lane, Mansfield.

DRAGON 32 SOFTWARE on tape. From £1.95. Send SAE for list. ATL (D), 115 Crescent Drive South, Brighton, BN2 6SB

APPLE II Network System 3. Applies 5 Meg. Conus multiplexer, language cards, personality cards. £40.00 ono. Tel. 736 3636

T1904/A SOFTWARE ON TAPE, from £1.95. Send SAE for list. ATL 115 Crescent Drive South, Brighton BN2 6SB

SPECTRUM 16K. Firefighter, Golf, Indexer and Buzzman. All on one cassette. £3.50. R. G. Martin, 56 Quakins, Bracknell, Berks

ATARI PLUS II GAMES. Cost £300, accept £180. 73 St Mary's Road, Leyton, London E10

BBC B "COLOUR LOGIC". Mastermind-type game. Tested on O.S. 0.1 and 1.2 with disk. Comes with FREE O.S. 0.1 patch and user-key routines. All on tapes. Only £2.75 from 1. Burley, 30 Spirelaze Hill, Loughborough

FEASIBILITY STUDY. Anyone interested in joining a software exchange club. Send details of your computer and software owned to 15 Tunwell Greaves, Sheffield S5 9GB

VIC20 KEYBOARD BLEEPER PROGRAM (uses machine code interrupt) cassette, £2.00. Listings £1.00. Andrew Buck, 8, Carey Parc, Helston, Cornwall

SPECTRUM AND ZX81 SWITCHING UNITS. No more pulling out plugs. Send £4.00, payable to M. Purcell, The Willows, Lower Road, Beeston, Nottingham

SEVEN ZX81 GAMES worth £50. Star Trek, Warrior, Trader, 3-D Maze, Flight Simulator. Will sell for £19. Tel. 0436 5754

SPECTRUM GRAPHICS. Demonstration of Plot Draw Sin Cos UDG colour animation. Instructive and entertaining. Cassette for 16K £4. Willden, Maybank, Yew Tree Lane, Rotherfield, Sussex

SPECTRUM AND JUPITER Ace software wanted. Top royalties paid. Cassettes to N. A. Barnett, 7 Oakwood Drive, Aspley, Nottingham NG8 3LZ

WANTED. Any ZX81 or Spectrum genuine cassettes. Get some money back from your software investments. Send list and quotation to C. Holm, Konvaljyvägen 8-53171, Lidköping, Sweden

EPROM PROGRAMMING SERVICE. 2K/4K EPROMs supplied, programmed to your requirements. Send SAE for details to Trent Micro Systems, 2 Parkdale Court, Kenilworth Road, The Park, Nottingham NG7 1DD

ZX81 SOFTWARE. My cheap second-hand Vu-Calc, Star Trek, Chess, etc. SAE Mr H. S. Moss, 17 Appleford Close, Hoddeston, Herts

PROGRAMS for the BBC Spectrum. Vic. Send SAE to Odyssey Software, 8 Greenbrook Avenue, Hadley Wood, Barnet, Herts

SPECTRUM 48K ZX81 TRS80 VIDEO GENIE

Now!
For the
SPECTRUM
FOOTBALL
MANAGER
IN 3D COLOUR GRAPHICS

Features include:

- ★ 4 DIVISIONS ★ F.A. CUP ★ PROMOTION & RELEGATION ★ TRANSFER MARKET
- ★ TEAM SELECTION ★ SAVE GAME FACILITY ★ LEAGUE TABLE ★ AND MUCH MORE!

Also available at BARNETTES & CO. 100-102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 770, 772, 774, 776, 778, 780, 782, 784, 786, 788, 790, 792, 794, 796, 798, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000

We're tired of telling you how good our game is,.... let our customers tell you

I received F.M. about 10 days ago, and have played about 23 hours so far - and declare in the appropriate word -

D. BLAIR, FIFE

I think your game is fabulous since starting with Park Vale in the 4th Division, being promoted, winning the F.A. Cup, and being promoted again to the 2nd Division.

C. DICKENSON, CANTERBURY

I recently bought your F.M. program and was very pleased indeed. I found it very good value for money and played it all day the day it arrived - I own a ZX81 which is now only used for F.M. - Yours obediently, M. FRAMPTON, CANVEY ISLAND

I felt that I had to write and congratulate you on your program F.M. I found the game very compelling and exciting, really just like the real thing - keep up the good work and standard -

N. LAWRENCE, FULHAM

ORIGINALS CAN BE SEEN OR REQUEST

Also available at BARNETTES & CO. 100-102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510, 512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550, 552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590, 592, 594, 596, 598, 600, 602, 604, 606, 608, 610, 612, 614, 616, 618, 620, 622, 624, 626, 628, 630, 632, 634, 636, 638, 640, 642, 644, 646, 648, 650, 652, 654, 656, 658, 660, 662, 664, 666, 668, 670, 672, 674, 676, 678, 680, 682, 684, 686, 688, 690, 692, 694, 696, 698, 700, 702, 704, 706, 708, 710, 712, 714, 716, 718, 720, 722, 724, 726, 728, 730, 732, 734, 736, 738, 740, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 770, 772, 774, 776, 778, 780, 782, 784, 786, 788, 790, 792, 794, 796, 798, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000

HARDWARE REQUIRED

Spectrum 48K RAM	TRS80 Video Game
ZX81 16K RAM	LEVEL II 16K RAM

To Order send Cheque P.O. £7.95 made payable to

ADDITIVE GAMES

at Dept. P.O.C. P.O. Box 278

CONNINGBROUGH,

MILTON KEYNES MK14 7NE

PLEASE STATE COMPUTER

CHANNEL 8 SOFTWARE

**£100 OFF THE ATARI 800
NOW ONLY £399.00 WITH BASIC**

**COMING SOON. THE ULTIMATE IN PLAYER
MISSILE DESIGN UTILITIES
"THE CONSTRUCTOR"**

**NOW IN. A FULL TYPEWRITER KEYBOARD
FOR THE ATARI 400 FITS IN PLACE OF THE
TOUCH KEYBOARD. ONLY £79.95**

MURDER AT AWESOME HALL	Cassette (16K)	£12.95
SKY SNAKES	Cassette (16K)	£9.95
BOMB HUNTER	Cassette (16K)	£16.50
CAVES OF DEATH	Cassette (24K)	£19.95
CAVES OF DEATH	Disk (32K)	£19.95

ATARI AM 400 Computer (16K)	£199.00
ATARI 400 Computer (16K with BASIC)	£249.00
ATARI 800 Computer (16K with BASIC)	£399.00
ATARI 810 Disk Drive	£299.00
48K Conversion for ATARI 400 (Exchange Price)	£99.90

NORMAN AUDIO stock a wide range of Software from the following manufacturers:
Aytron H&I, Atari, Channel 8 Software, Alan Program Exchange, Income Software, Adventure International, Arcade Plus, The English Software Company, Santa Cruz Educational, Personal Software, Dataship Inc, Spectrum Computers, Thom EMI Video

ALL PRICES INCLUDE VAT AND POST & PACKING

NORMAN AUDIO LTD

51 Fishergate, Preston, Lancs.

Tel. (0772) 53057

SPECIAL CHRISTMAS ZX MICROFAIR!

If you're interested in exhibiting please contact Mike Johnston



Saturday 18th December at the New Horticultural Hall, Greycoat Street, London SW1. One day - 10am to 6pm.

Thinking of buying your Christmas computer? Looking for ZX hardware or software? Want to meet local user-groups and ZX enthusiasts?

Or just want an interesting day out?

Then call along on Saturday, 18th December for the **Christmas Special MICROFAIR!**

It's full of Christmas Cheer — everything for the ZX81, ZX80 and ZX SPECTRUM under one roof!

Meet a wide range of manufacturers of all types — talk to interesting people — get advice — buy that last minute present.

There's plenty of room, there's a Bar if you get thirsty and a Buffet if you're famished!

There's even a bring and buy sale so you'll be able to pick up a bargain, and of course a complete showguide available on the day.

Make a note of the date or write for advance tickets to Mike Johnston, 71 Park Lane, London N17 0HG (enclosing a S.A.E.).

Admission charges are 75p for adults or 50p for kids (under 14). Please make cheque, P.O. payable to **Microfair**.

Do it now and make sure of a very happy XMAS!



BBC ELTEC SERVICES LTD

BBC MICROCOMPUTER SPECIALISTS



COMPUTERS

BBC Model A — in stock now £208.00
BBC Model B — in stock now £269.00
BBC Model A — plus using two monitors £234.00
VAX in the morning (see below for ACORN) £31.00
FULL UPRADE KIT (includes ACORN board) £70.00
VAX Kit (see below for details) £110.00

BBC SOFTWARE

ACORN/ST Pico Computer £9.95
ACORN/ST Defender £9.95
ACORN/ST Monkeys £9.95
ACORN/ST Philosophers Owl £9.95
ACORN/ST Snapper £9.95
ACORN/ST Arcade Action £11.00
ACORN/ST Desk Diary £9.95
Snapper (Museum) £11.00
Snapper (Super) (includes 1000000) £11.00
Snapper 'B' (includes 1000000) £11.00
Snapper (Bedroom) (see below) £11.00
Snapper (J-MAX) (see below) £11.00
Snapper (Wardrobe) £11.00
Agents for BBC, ELTEC & PROGRAM POWER software

PRINTERS

Stokholm Q100A £229.00
EPSON MB-611 £189.00
EPSON MB-501 £159.00
EPSON MB-501 £159.00
EPSON MB-501 £159.00

EDUCATION PACKS by PROCYON

All the following are designed to teaching teachers to control by professional programmes. They are intended for use with the BBC Microcomputer. In school it is recommended that you have a minimum of 1000000.
PROCYON Q100A (includes 1000000) £11.00
PROCYON Q100A (includes 1000000) £11.00
PROCYON Q100A (includes 1000000) £11.00
PROCYON Q100A (includes 1000000) £11.00
PROCYON Q100A (includes 1000000) £11.00
PROCYON Q100A (includes 1000000) £11.00

CASSETTE RECORDERS

Cassette Recorder (Pico) £21.00
Cassette Recorder (Monkeys) £21.00
Cassette Recorder (Snapper) £21.00
Cassette Recorder (J-MAX) £21.00
Cassette Recorder (Wardrobe) £21.00

BBC BOOKS

BBC ZX81 Book £1.50
Practical Programs for the BBC Microcomputer £1.50
BBC ZX81 Book £1.50
Practical Programs for the BBC Microcomputer £1.50
BBC ZX81 Book £1.50
Practical Programs for the BBC Microcomputer £1.50

MONITORS

14" Full colour MONITOR (used in BBC computer) £209.00
14" Green Screen MONITOR £129.00
AUS Monitor £129.00
Monitor test £1.00

PS FOR ATOM OWNERS!

DISKION SUPER ROM 27 new words plus £29.95
FULL DISKION ROM 27 new words plus £29.95
DISKION ROM 27 new words plus £29.95
DISKION ROM 27 new words plus £29.95
DISKION ROM 27 new words plus £29.95
DISKION ROM 27 new words plus £29.95

ELTEC SERVICES LTD
231 Manningham Lane, Bradford BD8 7HH
Tel: (0274) 491371

OPEN Mon-Fri 9am-5pm Sat 9am-12 noon
Prices are VAT INCLUSIVE

P&P £1.00 for orders under £100.00. Orders over £100.00 add £10.00 for a Securicor Delivery

A coven to set you square

Puzzle No 34

In the diagram, 13 possible triangles can be formed. The total number of triangles in a grid of any size is given by the formula: $T = N(N + 2)(2N + 1)/8$, where N is the number of tiers. Any remainder left after the division is ignored.

The formula for finding out the number of squares in a square grid is: $T = M(M + 1)/6$. So, for example, an 8×8 chessboard would contain 204 squares of various sizes.

Two pieces of paper — one with a grid of triangles, the other with one of squares, are placed on a table. Twice the number of squares as triangles can be found. What are the sizes of the grids?



Solution to Puzzle No 29

This algorithm is a standard 'bubble sort'. The last ear you put down is the largest, and the rest are ranged in sequence according to size. The stone(s) are used to indicate that the sort is complete. A program to sort out ears could be:

```
10 DIM E(n)
20 FOR A = 2 TO n
30 IF E(A) < E(A - 1) THEN LET B = E(A): E(A) = E(A - 1): E(A - 1) = B: S = 1
40 NEXT A
50 IF S <> 0 THEN S = 0: GOTO 20
60 STOP
```

Winner of Puzzle No 29

The winner is: Alan Honey, Endcliffe Vale Road, Sheffield, who receives £10.



Hunting the cable

An economist, J Maynard Keynes, had a wonderful way to regenerate British industry. Writing in *The General Theory of Employment* ... (1936) he emphasised the importance of public works to pump money into the economy — he also emphasised the unimportance of the nature of the actual public work.

One example he gave was for the Treasury fill old bottles with banknotes, bury them at a suitable depth in disused mine shafts, and then fill the mine shafts with rubble. Private enterprise was then left to dig up the notes again.

Keynes predicted there would be no more unemployment thanks to the knock-on effects of the employment generated, and also in the end the community would be far richer. His argument is now accepted strategy.

In the report of the inquiry into cable expansion and broadcasting policy, under Lord Hunt (HMSO, October 1982), the recommendations are liberal in the extreme, with the clear avowed intent of generating wealth by the knock-on effect. The Hunt Report, which is being used to encourage investment into cable television, is remarkably light on figures and finances — partly due to its rather restricted terms of reference.

Searching through the Hunt Report for details of how much it will cost to connect up a house to a cable network, and how much the rental will need to be to assure a viable network, I had to draw a blank. I was provided with lots of estimates about advertising revenue, and per-

centages of the Gross National Product, but nowhere was this basic information given.

In an earlier report (*Cable Systems*, HMSO, 1982) it is estimated that to connect up a house will cost in excess of £250 (probably much more), with a monthly rental of at least £25.

It discusses neither the technology to be used to cable up the country (ie whether co-axial or fibre-optic cables should be used) nor the provision of interactive services for business and the consumer (eg sending computer software down the line to the user's computer). What is generally agreed, or so the Hunt Report claims, is that investment in cable television for entertainment purposes will be the necessary base from which the interactive services of economic benefit (their terms) will be built up.

Instead of bottles of bank notes, there will be 30 television channels. When editors and writers in papers and magazines expound at length on what the new cable systems will bring, remember this: it will not be free. It will be rather expensive and all the new services will have to wait until the television channels are viable.

Finance for the cable network, and the television services they bring, will be first and foremost the rental charge for a basic package of cable services. (Remember that the householder will have to pay for the connection in the first place, and there will be a new type of television to be acquired.)

Once the rental for the basic service has been paid, then it will be lawful to charge extra for additional channels. But, all channels will have to have advertising to make the system pay. If there are 30 channels advertising, the attraction of each channel for advertisers will diminish — with soap opera on 15 channels, how is the subscriber (or advertiser) to choose?

About 75 percent of households are connected to the telephone network — the figure is higher for rural areas than it is for urban areas. Will the same be true for cable TV? And it is in the city that cable television will be at its most cost effective.

When you read about cabling, and hear that it is to be paid by the private sector, that's you. ■

Boris Allen

Top Sellers

Atari		
1(2) Submarine Commander	(Thorn EMI)*	
2(1) Jumbo Jet Pilot	(Thorn EMI)*	
3(3) Soccer	(Thorn EMI)*	
4(4) Froggie	(Adventure International)	
5(-) Choplifter	(Broderbund Software)	
6(-) Dragon's Eye	(Epyx)†	
7(9) Snooker/Billiards	(Thorn EMI)	
8(-) PacMan	(Atari)*	
9(-) Shamus	(Synapse)	
10(-) Centipede	(Atari)*	

*Cartridge, †Disk only.

(Figures compiled by Calisto Computers, Birmingham, 021-632 8458)

ZX Spectrum		
1(7) Maze Man	(Abbersoft)	
2(1) Spectral Invaders	(Bug-Byte)	
3(-) Spectres	(Bug-Byte)	
4(2) Escape	(New Generation)	
5(-) Arcade pack	(Control Technology)	
6(4) Star Trek	(Chromasoft)†	
7(1) Football Manager	(Addictive Games)	
8(-) Adventure 1	(Abbersoft)	
9(8) Spectrum Chess	(Arctic)	
10(8) Gulpman	(Campbell Systems)	

*Requires 48K.

(Figures compiled by Buffer Micro Shop, London, 01-769 2887)

Books		
1(2) ZX Spectrum Explored, Hartnell		
2(3) BBC Micro Revealed, Ruston		
3(5) Easy Programming for the ZX Spectrum, Stewart and Jones		
4(7) Over the Spectrum, various authors		
5(5) 280 Assembly Language Programming, Leventhal		
6(5) Programming the 6502, Zaks		
7(1) Starting Fort, Brodie		
8(5) Machine Code and Better Basic, Stewart and Jones		
9(-) The ZX Spectrum and how to get the most from it, Sinclair		
10(-) 6502 Assembly Language Programming, Leventhal		

(Figures compiled by Watford Technical Books, Watford, 0923 23324)
(Last week's position in brackets)

ZX81*		
1(3) 3D Defender	(JK Greys)	
2(8) Mazeman	(Abbersoft)	
3(1) Gauntlet	(Coleman)	
4(-) Adventure 1	(Abbersoft)	
5(-) Mazog	(Bug-Byte)	
6(-) Chess	(Arctic)	
7(2) Frogger	(DJL Software)	
8(-) Trader	(Pearl)	
9(-) Football Manager	(Addictive Games)	
10(5) Gulp II	(Campbell Systems)	

*All require 16K Ram.
(Figures compiled by Buffer Micro Shop, London, 01-769 2887)

Vic		
1 (8) Grid Runner	(Llamesoft)	
2 (2) Defenda	(Llamesoft)	
3 (-) Myriad	(Rabbit)†	
4 (10) Scribble	(Rabbit)	
5 (-) Adventureland	(Commodore)	
6 (6) Jellymonsters	(Commodore)	
7 (1) Sargon 11 Chess	(Commodore)	
8 (-) Pirates Cove	(Commodore)	
9 (4) Blitz	(Commodore)	
10 (-) Star Battle	(Commodore)	
10 (-) Traitor	(Llamesoft)†	

*Cartridge, †Requires 64K or 128K.
(Figures compiled by the Vic Centre, London, 01-852 9904)

LOSERS

unbeatable programmes.



We at Silica Shop are pleased to announce some fantastic reductions in the prices of the Atari 400/800 personal computers. We believe that the Atari at a new price will become the U.K.'s most popular personal computer and have therefore set up the Silica Users Club. This club already has a library of over 500 programs and with your purchase of a 400 or 800 computer we will give you the first 100 free of charge. There are also over 350 professionally written ten games and many more programs that are listed below. To get the full details, the reply coupon and we'll send you full details. Alternatively give us a ring on 01-301 1111 or 01-309 1111.

ATARI 800
with 16K **£449**

Don't buy a T.V. game! Buy an Atari 400 personal computer and a game cartridge and that's all you'll need. Later on you can buy the Basic Programming cartridge (35\$) and try your hand at programming using the easy to learn BASIC language. Or if you are interested in business applications, you can buy the Atari 800 + Disk Drive + Printer together with a selection of business packages.

Silica Shop have put together a full catalogue and price list giving details of all the peripherals as well as the extensive range of software that is now available for the Atari 400/800. The Atari is now one of the best supported personal computers. Send NOW for Silica Shop's catalogue and price list as well as details on our users club.

[illegible]

FREE LITERATURE

I am interested in purchasing an Atari 400/800 computer and would like to receive copies of your brochures and test reports as well as your price list covering all of the available Hardware and Software.

Name _____

Address _____

Postcode _____

PCWK 12 82

SILCA SHOP

For more information and assistance in our range of electronic products, please contact us at 011 753 76 2400 or visit us at www.753.com. You'll find more information, product literature and more.

- [illegible]

SHICA SHOP LIMITED

DEPT POWER 257, 1-4 The Mews, Wetherley Road, Biddenden
Kent DA20 2ST. Tel: 01843 851222. Fax: 01843 851133

